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SET ACTEON/ AQUA / ACTEWIN

DATE :
JANUARY/09/11
INDEX : 2
REF. : PONKITAQUA

SET

ACTEON/AQUA/ACTEWIN

MULTI-PARAMETER 6 SENSORS

For water quality monitoring

USER MANUAL

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AQUA PROBE

AQUA10 PROBE

AQUA50 PROBE

ACTEON 3000

SET

ACTEON 3000/ AQUA/ ACTEWIN

USER MANUAL

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WARNINGS

→ This material is scientific handheld instrument, it is important to support it with a minimum of maintenance. After each use, before storage in its case, you must clean the sensors : pH/Redox (cleaning solution : PON SOL NET), Conductivity/Temperature with a brush. Cleaning the level sensor but without introducing a needle or any pointed object into the holes and without using a powerful jet.

→ To store the AQUA probe, don't introduce water (and especially not purified water), into the conservation/calibration case but use some drops of conservation solution (ref : PON SOL CSV) on a wad.

The use of a too important volume of water in the conservation case causes a pressurization reflecting itself on the entry of the reference of the pH sensor when the stopper is tight. The pH reference is prematurely emptied of its KCl involving the fast deterioration of the sensor.

→ We point out that the AQUA probe should not be used in effluents being able to contain hydrocarbons, colloids, concentrated acids. Avoid too aggressive solvents.

→ Temperature of sensors for prolonged use : 50°C max.

→ If you don't use all sensors, put a Waterproof obturating plug in their place (PONAQUA-CAP1).

DATA TRANSFER :
→Stop the data recording on the ACTEON 3000 before transferring the data.

SENSORS :

→ Installation of a new pH sensor : place the sensor in water during 1 hour then transfer it in a standard solution during 30 minutes in order to activate the reference. Then carry out its calibration in « Calibration » mode and check the quality of its calibration in " Measure" mode placing the electrode in 2 different buffers.

→ Installation of a new conductivity sensor : if the value read in "measure " mode presents a significant drift, pass a very fine abrasive paper on the 2 faces of the notch.

→ Concerning the calibration of conductivity, during the calibration using standard of 84µS/cm, it is strongly advised to first disconnect PODs sensors pH/Redox and Dissolved Oxygen, and insert the two obturating plugs tight in their place on the 2 released base plates. Indeed these two sensors are likely to throw out a significant quantity of KCl salt in the standard of very low conductivity, especially the Ag/AgCl reference by the means of its Plastogel^{R} polymer gorged with saturated KCL (communication through the 1/10 mm side hole in the blue body cylindrical of pH/ORP POD). The pollution of the standard 84 µS/cm is rather fast, especially if you await the perfect thermal stabilization of the sensor, which takes several minutes. It is even advised to proceed the same way for the standard 1413 µS/cm if one wishes a calibration of laboratory precision on this measurement range, with better than +/- 0,5 %.
Check that in "parameters" the mention AUTO is apparent (automatic adjustement to appropriate range). To validate pass on another sensor and make "Esc" (otherwise, you desactivate the AUTO mode for a precise range).
Carry out the calibration and check out the quality of its calibration in " Measure" mode.

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SYMBOLS AT THE BOTTOM OF THE ACTEON SCREEN

Exhaustive list of the symbols used and their meaning:

10-20-03 09:06 Date : Month-Day-Year hour : minute

10-26-03 12:31:45 000357/000714 Recording file : Date of measure (M-D-Y H:m:s) measure N°/ Number of measures

Battery capacity

New batteries (Bat ≥ 6 V)

Acceptable batteries (Bat = 5,5V)

Worn batteries (Bat < 5 V)

The exact battery tension is obtained in **Main Menu →History →** ACTEON 3000S

Watershed memory

Empty Memory or **OM<** 25 % or created files **<** 25 % or **<** 4 with 1Mo memory

Occupation **M**emory ≥ 25 % or created files ≥ 25 % or ≥ 4 // //

Occupation **M**emory ≥ 50 % or created files ≥ 50 % or ≥ 8 // //

Occupation **M**emory ≥ 75 % or created files ≥ 75 % or ≥ 12 // //

Full Memory **OM** = 100 % or 100 % of created file **= 16** // //

The 16 files can share 32 768 recordings of 6 values each for the standard memory flash Data Logger 1Mo = 1024 KB.

*In **Watershed Memory** mode, for a memory of 1 Mo, beyond recorded 16 files in Actéon the creation of a new file crushes the first created file (first in, first out), and so on. It is thus advised if needed, to download on PC the totality of the 16 files, starting with oldest (SAFEGUARD).*

*In **Watershed Memory** mode or in **Fixed Memory** mode, with the 8 Mo of flash memory data logger option, you can create and record up to 128 files (instead of only 16), sharing the 262 144 possible recordings of 6 values each*

Fixed Memory

Empty Memory or **OM<** 25 % or created files **<** 25 % or. **<** 4 with 1Mo memory

Occupation **Memory** ≥ 25 % or created files ≥ 25 % or ≥ 4 // //

Occupation **M**emory ≥ 50 % or created files ≥ 50 % or ≥ 8 // //

Occupation **M**emory ≥ 75 % or created files ≥ 75 % or≥ 12 // //

Full Memory **OM** = 100 % or 100 % of created files **= 16** // //

*In **Fixed Memory** mode, for a memory of 1 Mo, beyond 16 recorded files the creation of a new file is impossible: you can enter the name of the 17th file and configure its recording mode, but any manual or programmed attempt to launch recording will fail : Short appearance of the icon **Rec** (Record) then emission of a double beep → disappearance of « **Rec** », no saving of the file name in the « Results » menu which lists all recording files of Actéon.*

If you want to create an additional recording file :

- *Download the 16 files on the PC for safeguard, then carry out a general reset of the memory (Menu: **Configuration → Mémory → Reset**)*
- *Or, if you accept to lose old recordings, switch to the **Watershed Memory** mode (while knowing that the oldest file will be crushed and lost, unless preliminary downloading it on your PC).*

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Aqu **Aqu**a probe connected to Actéon 3000 and SDI-12 connection is working **(dialogue Aqua ←→ Acteon is OK)**

Rec (**Record**) Recording of selected parameters (Or on standby in the **Snapshot** mode).

Snapshot recording mode "One-shot" at each manual pressure on **Enter** keypad.

A↓ **Manual Start** Recording mode: Automatic Recording of the parameters after manual start on **Enter**).

Aut **Program Time** Recording mode: Automatic Recording with programmed start and end dates.

Pulse Option Recording mode : Associated with the 2 **AUTO** recording modes for water sampling .

PC Downloading **PC** (Import/Export Actéon←→PC with **Actewin** software)

Associations of the symbols and their functional description :

State :	Functional description :
11-13-03 20 : 03	Date and hour, batteries and memory (revolving or fixed) capacities. ***Always on the screen***
11-13-03 20 : 03	
11-13-03 20 : 03 Aqu	AQUA probe connected to Actéon and correct dialogue
11-13-03 09 : 10 A↓ Aqu	The **Manual start** recording mode Auto "was trigged" throught the Actéon menu : Configuration → Recording → Manual start (But AQUA is not connected) or by Actewin on PC → Actéon Programming (AQUA inevitably disconnected)
11-14-03 09 : 12 A↓ Aqu	The AQUA probe is connected to Actéon, on standby before starting in **Measure** mode (no recording started if not in **Measure** mode) through **Manual start** of recording (**Enter**).
11-14-03 10 : 30 A↓ Aqu Rec	The **Manual start** recording mode was started. It will only stop with another manual action : **Configuration→recording→stop recording** The only case it will stop by itself is in **fixed memory** mode if the memory capacity is full.
11-14-03 16 : 30 Aqu	After **Stop recording** or possible auto-stop if memory is full in **Fixed memory** mode

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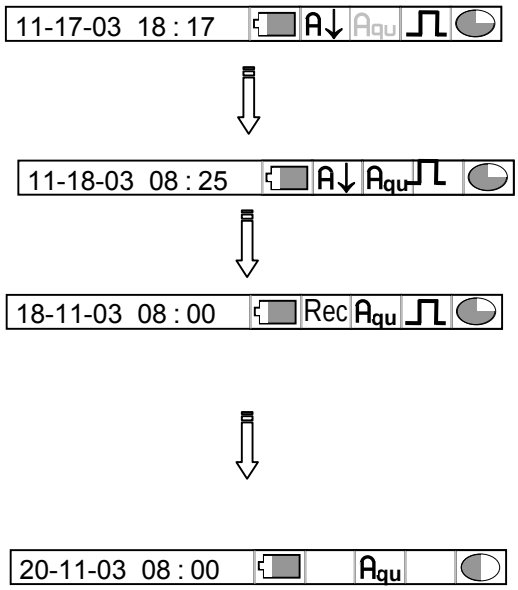


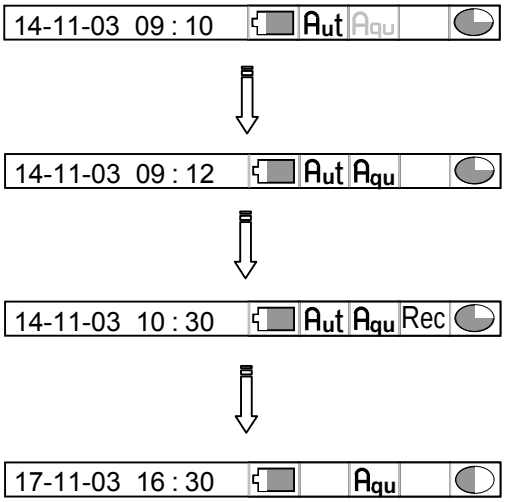
The recording mode **Manual Start + Pulse option** "was trigged" by Actéon menu : Configuration → Recording → Manual Start then → Pulse Option (Aqua probe connected or not) or by Actewin on PC→ Programming Actéon (Aqua probe inevitably disconnected).

The Aqua probe is connected to Actéon, on standby before starting in **Measure** mode (no recording started if not in **Measure** mode) through **Manual start** of recording (**Enter**).

The Manual Start mode recording was started. It will stop only on another manual action. However, possible to auto-stop in Fixed memory if the occupancy rate of the memory reaches 100 %

Pulse: with each batch of recorded measurements, values of one or two parameters will be compared with **high** and **low threshold**, and according to their positions compared to these thresholds and the logical condition binding the parameters (and, or), the **Pulse exit** (free contact of potential with opto transistor) will be generated to start a water sampling.

Stop recording : **Manual validation** in menu **Configuration → Recording → Stop** recording or possible auto-stop in Fixed memory .



The Program Time mode was validate by Actéon menu : Configuration → Recording. → Progran Time (Aqua probe connected or not) or by Actewin software on PC→Programming Actéon (Aqua probe inevitably disconnected)

The Aqua probe is connected to Actéon, **on standby** waiting for the starting time of **Program Time** mode to start recording (It is not necessary to be in **Measure** mode at the time of starting).

Automatic recording started at the programmed starting time and is running

Stop recording:

- Normally at the programmed end date ,
- Or possible manual interruption before this date: Manual validation in menu **Configuration → Recording → Stop Recording.**
- Or possible Auto-stop in Fixed memory if memory saturated

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1. CASE CONTENTS

The complete case comes with the following items:

- 1. AQUA probe with its sensors connected and its protection case
- 2. Acteon 3000 portable terminal
- 3. Ballasted strainer
- 4. AQUA probe cable (15, 20 or 30m depending on client's order)
- 5. Actewin adapter (SDI12/RS232)
- 6. Calibration standard pH 4,01 ; pH 7,01
- 7. Calibration standard for conductivity 1413µS/cm ; 12,88 mS/cm
- 8. Calibration standard for ORP 240mV
- 9. Electrolyte oxymetric standard for D.O. sensor
- 10. Sodium sulphite (Zero O_2)
- 11. Case with 2 spare membranes for the dissolved oxygen sensor
- 12. CD ROM with ActeWin software and user manual in pdf-format
- 13. Acteon and AQUA connection cables for adapter SDI12/RS232
- 14. Waterproof obturating plugs for sensors disconnected (2)

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2. ACTEON PORTABLE TERMINAL

2.1 KEYBOARD DESCRIPTION :

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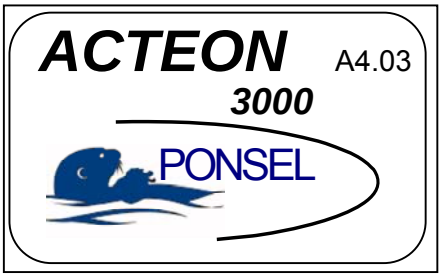
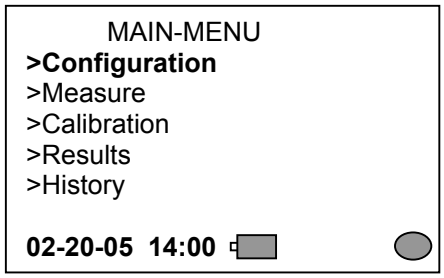
2.2 POWERING UP THE DEVICE

Push button ⏻ in the upper left corner of the keyboard.

A homepage will show for 10 seconds before the Main Menu appears.
To push on any key to interrupt the homepage.



Important : when the Acteon is running, an energy economizer releases automatically after 20 minutes and turns off the LCD. Just push on any key so as to relight the screen. You come back on the last screen of the menu in progress, no data is lost. **If a recording has been launched with the on-line AQUA, it carries on without interruption**. On the other hand, in perpetual measure mode, no launched recording, measures stop during the screen lights out . The Actéon + Aqua probe only consume 20 µA in this sleeping mode.

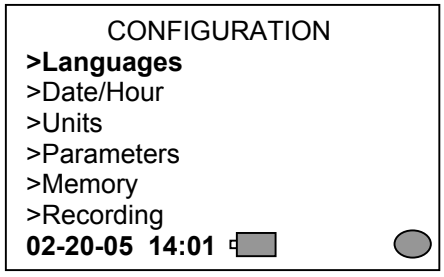


The up and down navigation keys allow choosing a section; the ENTER-key allows confirming your choice.
A status bar at the bottom of the screen indicates the date and time, battery capacity and the 4 levels of **memory occupation** :

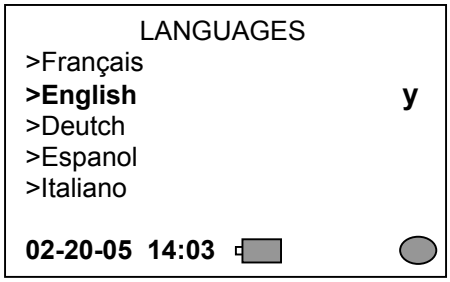
:Empty or <25% :≥25 % :≥50% :≥75% :=100% Full

Battery capacity :
New batteries : (Bat ≥ 6 V)
Acceptable batteries : (From 6,5 to 4,5 V)
Worn batteries : (Bat< 4,5 V) *Change the 4 batteries*
Three other symbols will appear according to the actions taken.

2.3 CONFIGURATION :



2.3.1 LANGUAGES :



Language can be chosen with the up and down arrow keys ; the ENTER-key allows confirming your choice.

Next press Esc

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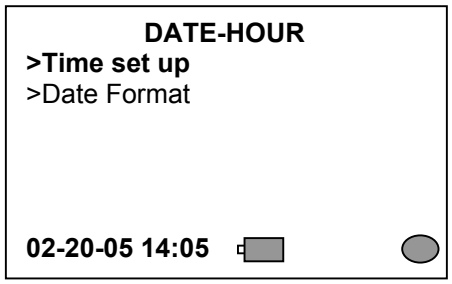
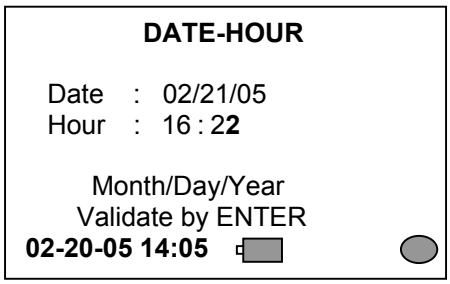
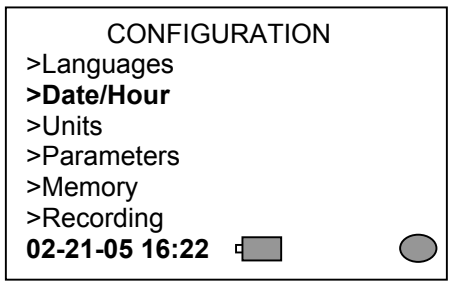
2.3.2 DATE/ HOUR :



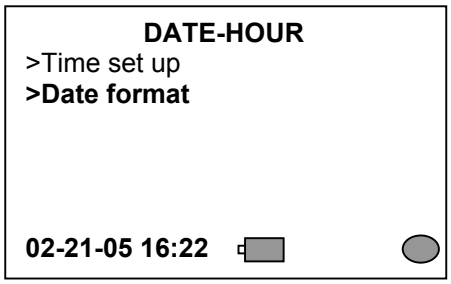
Press ENTER key for time set up.



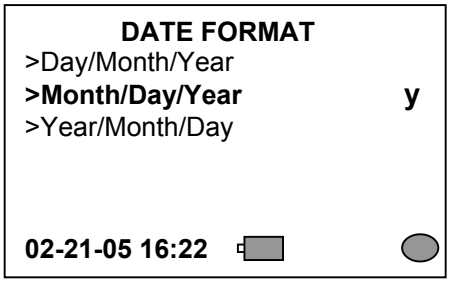
The cursor is initially placed on the month ; enter date and time and confirm by pressing the ENTER key.



Check date and time modifications on the bottom of the « CONFIGURATION » menu.



If you wish to change the date format, go down with the navigator's key Down.
Press ENTER key for date format.



You can choose the format:
- European,
- **American**
- International ISO 8601 standard

Navigate until the date format wished:
Press ENTER key for date format selected → **y**
Then press **Esc**

If you select for ex. the International ISO 8601 standard, the date displayed down on the status bar will become :

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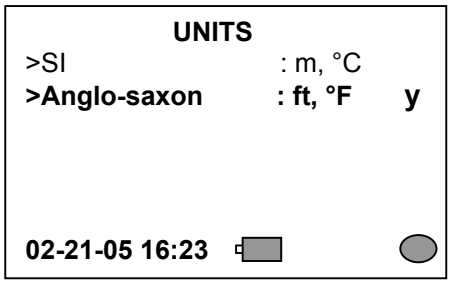
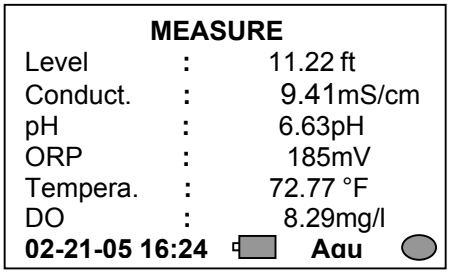
2.3.3 UNITS :



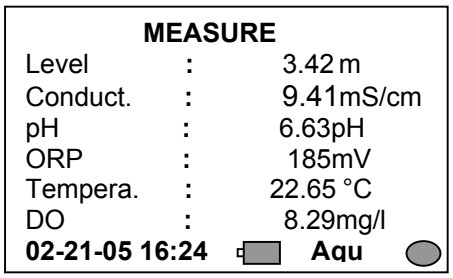
You can choose the units for measures :
- SI (meters and Centigrade-Celsius degrees)
- **Anglo-saxon** (Feet and Fahrenheit degrees)

Navigate until the units wished:
Press ENTER key for units selected → **y**
Then press Esc



If you chose and validated the Anglo-Saxon units :
(Feet and Fahrenheit degrees) :

All Depth and Level values will be displayed and recorded in ft, all temperature values in ° F, for calibrations and calibration history.
In Measures mode you will see displayed the following values on the screen.



If you chose and validated the SI units :
(Meters and Celsius degrees) :

All Depth and Level values will be displayed and recorded in m, all temperature values in ° C, too for calibrations and calibration history as well.
In Measures mode you will see displayed the following values on the screen.

Nota :

1 **ft** =0,3048 m 1 m =1/ 0,3048 **ft**

°F =°Cx1,8 +32 °C = (°**F** - 32) / 1,8

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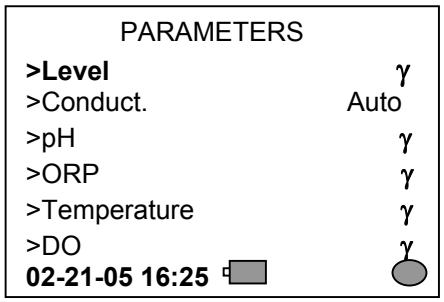
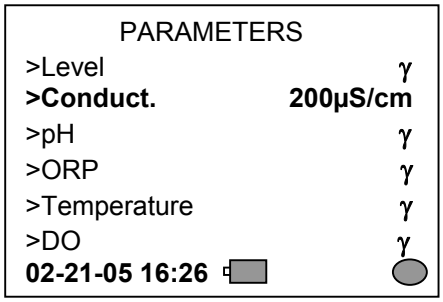
2.3.4 PARAMETERS :



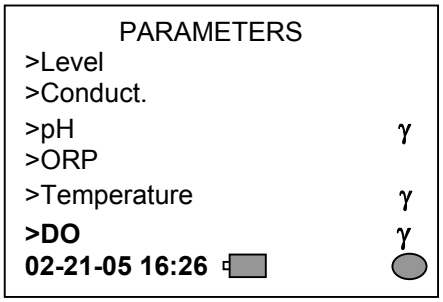
With the up and down arrows you can move through the menu and choose the parameter to confirm in measure and recording.
Use the right arrow or ENTER-key to « confirm » or « cancel » the parameter chosen.
This function is realized by the γ sign on the right side of the parameter.
When all parameters are confirmed/canceled, **press Esc**



Different options are available for the conductivity sensor :

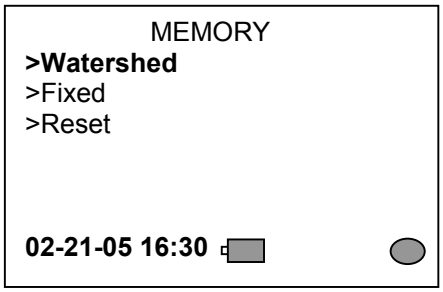
- **Auto**matic range (0-200 000µS /cm) :maximal accuracy
- [None] and optimal linearity.
- 200µS /cm
- 2000µS/cm
- 20mS/cm
- 200mS/cm

Select the range with right arrow or ENTER-key.
Then, press Esc (Or up/down arrows for another parameter)
Important warning:
Select of preference the automatic range (0-200 000µS/cm) in recording see chapter 2.6.3. « Conductivity » page 22.
Check always beforehand : menu **Configuration => Parameters => >Conduct. Auto** . then **Esc**



In this example the parameters pH, Temperature and Oxygen are " confirmed ", the others " canceled "
Alone these 3 parameters will be measured, displayed and recorded.

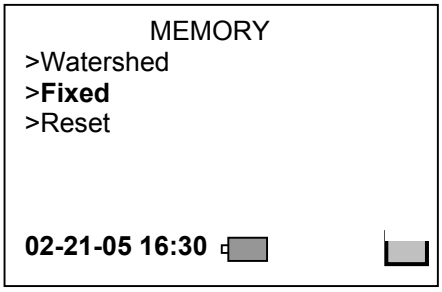
2.3.5 MEMORY:



There are three memory-possibilities :

Watershed memory : Once the memory is full, the first data will be erased to create memory space for writing current data (according to the « first in, first out » method). When choosing this option, the symbol will appear on the lower right side of the screen.

Fixed memory : Once the memory is full, recording will stop. When choosing this option, the symbol will appear on the lower right side of the screen.
Nota : filling up by 1/4 slices (see chapter 2.2 page 6)



Reset : Allows complete erasing of the memory.(**All** data-recording files are irreversibly destroyed at the same time : the register RESULTS becomes empty !).Validate this option by the ENTER-key.
For the option «Reset» a user confirmation is required :
« Are you sure ? » -No
-Yes
No : The « MEMORY » menu screen comes back
Yes : The message « Erasing Flash » appears for 4 seconds on the screen, then goes back to « MEMORY »

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2.3.6 *RECORDING :*

RECORDING
>Stop recording
>**Manual start**
>Program time
>Pulse Option
>Snapshot

02-21-05 16:35

2 AUTOMATIC RECORDING MODES FOR PARAMETERS:

- **Manual start :** automatic recording mode, with **manual** start and stop.
- **Program time:** automatic recording mode, with departure and stopping dates **programmed** in advance.
- **Pulse Option :** *is only an optional complement for* Manual start *and* Program time *modes (for waters samples).*
- **Snapshot:** *is not an automatic mode, but measures logging bit by bit, purely manual , which is not configured in advance.see 2.4.1*

(If you validate **Snapshot** *in this menu, a simple information appears : «* Press ENTER in **measure** mode*)*

a MANUAL START :

MANUAL START

Interval : 00h00m05s
Name : STATION 0**2**
Validate by ENTER

02-21-05 16:37

Type an interval time between a minimum of 5 seconds and a maximum of 23h59m59s , then type a file name of 14 alphanumeric characters.

RECORDING
>Stop recording
>**Manual start**
>Program time
>Pulse Option
>Snapshot

02-21-05 16:37 A↓

After programming, the symbol **A↓** appears on the bottom of the screen.

A↓ is the abbreviation of **A**utomatic **+** Manual start (↓)
The recording will be well automatic to every interval of time selected, but the start is launched by hand.

MAIN-MENU
>Configuration
>Measure
>Calibration
>Results
>History

02-21-05 16:38 A↓ Aqu

To record values :
Plug the AQUA probe on the Acteon: the **Aqu** icon (**AQUA**) appears on the bottom of the screen, after a while of some seconds, meaning that the dialog is in progress. As long as the probe is connected, this symbol stays displayed. Next, go to the main menu and press the down arrow to choose the mode « **Measure** » (perpetual measuring)

MEASURE

Level	:	10.22 ft
Conduct.	:	5.41mS/cm
pH	:	7.63pH
ORP	:	282mV
Tempera.	:	70.74 °F
DO	:	9.23mg/l

02-21-05 16:39 A↓ Aqu Rec

Press ENTER : after the message « Measure in process » the values of the 6 parameters appear and are refreshed all 5 s.
You can remain the time that you want in measure, without recording.
To launch recording : press once again ENTER which starts recording.
The **Rec** icon (**Rec**ord) appears in bottom **and will remain as long as the recording is not stopped** .The abbreviation **A↓** remain on the bottom of the screen (to indicate that the **A**utomatic recording of values having started in **manual** (↓) mode. The recording cannot be stopped from this screen .
To put an end to this recording : Esc → Configuration→Recording→ Valid **Stop recording.** **A↓** and **Rec** disappear.

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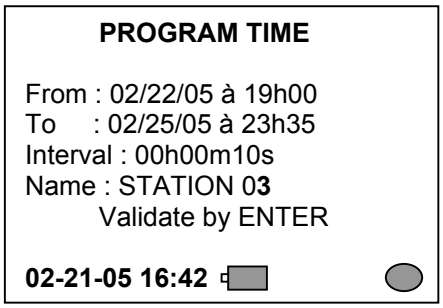
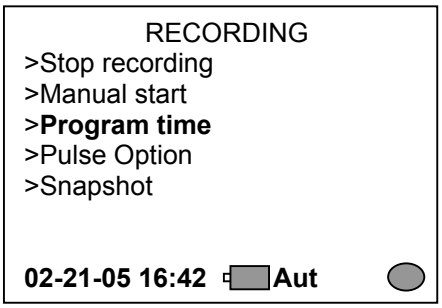
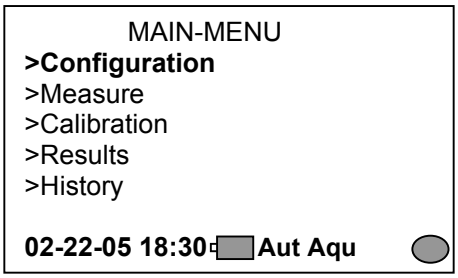
b PROGRAM TIME :



Fill in the fields start date/time, end date/time, time interval as well as the 14 character alphanumeric filename.

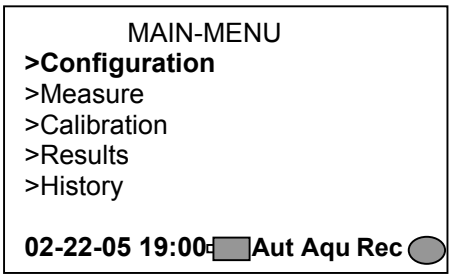


After programming, the symbol **Aut** (abbreviation of **Auto**matic) appears at the bottom of the screen.
The recording will be automatic to every interval of time selected, and will start / stop at the programmed times.

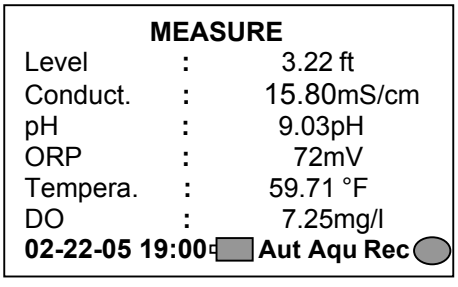


To record values :

A sufficient time before the programmed starting, plug the AQUA probe on the Acteon: the **Aqu** icon (**AQUA**) appears on the bottom of the screen, after a while of some seconds, meaning that the dialog is in progress. As long as the probe is connected, this symbol stays displayed. Next, go to the main menu.



Either :
You stay in the Main Menu and at the programmed hour, the recording starts. The **Rec** icon appears then on the right bottom of the screen.
The registration will only stop at the date of end programmed, but it is possible to stop it before: →Configuration→Recording→
Valid **Stop recording.**



Or :
Choose the mode « **Measure** » (perpetual measuring) and at the programmed hour, the recording releases.
It is the recommended* mode, because you can visualize that measures are correct, even when recording has been launched.

*** In fact, in Program time mode, the recording will start by itself on any page of menus, and even when the Acteon is switched off (red key On/Off in top on the left); Idem for the stop recording. *Only matters that the AQUA probe is connected.***

In Manual start mode, it is imperative to start the recording by hand in Measure mode, therefore Acteon switched on, and to stop it by Stop recording in the menu Configuration. But during the recording you can come off the Measure mode, and even to switch off the Acteon with the red On/Off : measures and their recording continue.

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c PULSE OPTION :

This mode is additional to the two previous described modes. It allows generating an order besides a water sampler according to the limits (tresholds high and low) of one or two parameters.

SAMPLE TRESHOLD
DO
0000.0mg /l
0000.0mg/l
Sampl. Inter. : 00h05m
Pulse Durat. : 000.03s
Use Up Down arrow
02-21-05 16:45

Use the up and down arrow to choose the parameter that refers to the value range of your choice :

- --None-
- DO
- Temperature
- ORP
- pH
- Conduct.
- Level

With the right arrow, place the cursor in the field «logical operation » (AND/OR, None) and choose this condition with the upper or lower arrow.

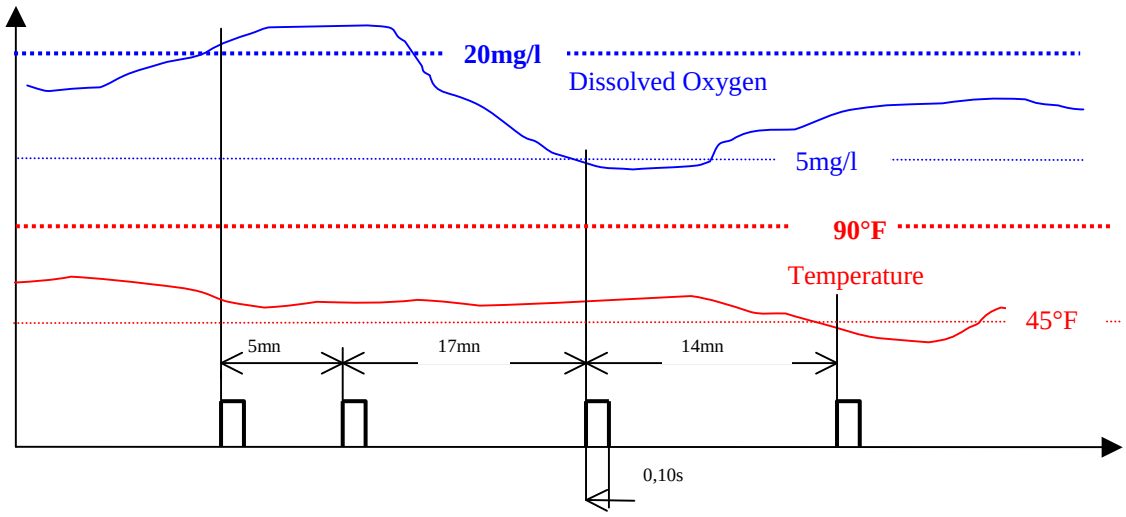
SAMPLE TRESHOLD
DO OR Temperature
0000.0mg/l ▲ 0000.0°F
0000.0mg/l ▼ 0000.0°F
Sampl. Inter. : 00h05m
Pulse Durat. : 000.00s
Use Up Down arrow
02-21-05 16:45

Choosing a logical operation (AND/OR) gives the possibility to choose a second parameter on the right side on the screen.
Pressing the right key selects the parameter ; the up and down keys allow to select the parameter.

SAMPLE TRESHOLD
DO OR Temperature
0020.0mg /l ▲ 0090.0°F
0005.0mg/l ▼ 0045.0°F
Sampl. Inter. : 00h05m
Pulse Durat. : 000.10s
Validate by ENTER
02-21-05 16:47

Pressing the right arrow gives access to the value fields. The first values define the high threshold. The second line defines the lower threshold. Enter the interval between the sample, and the duration of the impulsion.
This last information is variable according to the water sampler connected on the Acteon. The action on the key ENTER makes appear on the right the pictogram in bottom of the screen

Example:



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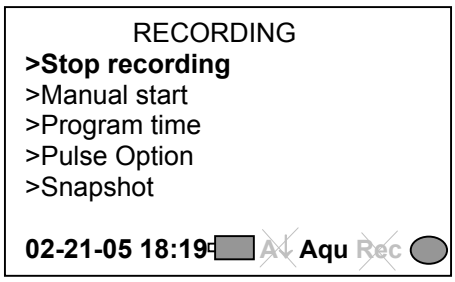
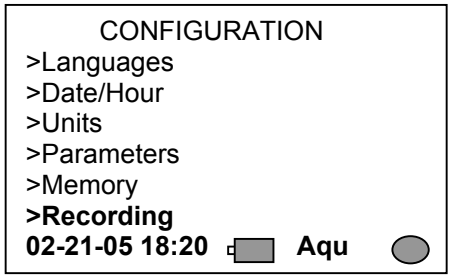
d Stop recording:



To stop one of the recording modes choose section « **Stop recording** » using the navigation keys and press **Enter**. The symbol **Rec** on the status bar will disappear, as well as all icons associated with recordings: **A↓ , Aut,** ⎍

The manual « Stop recording » is recommended systematicaly before connecting the Acteon on the PC, either to transfer recording files on the hard disk, or to reprogram the Acteon by PC.
Indeed, if it subsists the Rec icon associated to A↓ ou Aut ou ⎍**, a no connection message will appear on the PC (ActeWin software) : « Acteon Connection impossible. Check connections » : There is absolute refusal of link SDI-12 because all recording in progress by the Acteon has priority.**

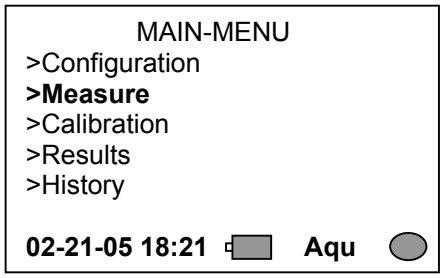
Press **Esc** two times to get back to the main menu.



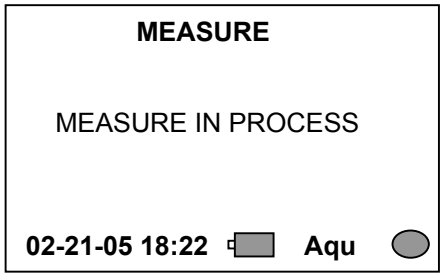
Very important: disconnecting the AQUA from the Acteon during a recording in progress is not equivalent to a « **Stop recording** »**. Aqu** and **Rec** remain displayed. If you try then to connect the Acteon on the PC, impossible to establish a dialog: beforehand, it is necessary to validate a " **Stop recording** "
***Nota** : You can disconnect and reconnect the AQUA probe on Acteon in the process of recording: there will only be a dead gap in the recording, corresponding to the disconnection period.*

2.4 MEASURE (PERPETUAL MEASURING):

Before choosing the mode «Measure» or perpetual measuring , connect the AQUA probe to the female 12-point connector located at the bottom of the case . An arrow indicates the connecting correspondence between the plug and the female connector. The symbol **Aqu**, meaning the recognition of the probe by the Acteon terminal, will appear under the screen.



Press the down arrow to choose the mode « Measure » (perpetual measuring)



Press ENTER : the message « measure in process » shows for 5 seconds, the measuring time.

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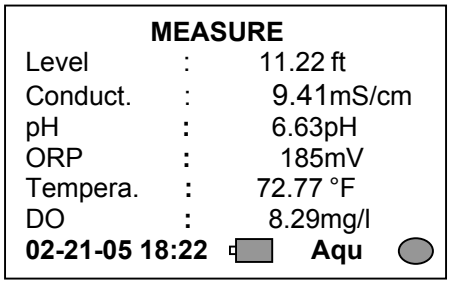
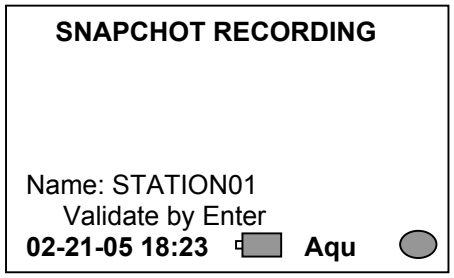
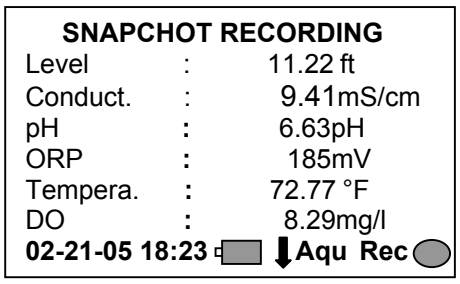


Display of the measuring results of the 6 parameters are shown on the screen. **Every 5 seconds, the results are updated.**

2.4.1 SNAPCHOT RECORDING MODE: (One shot)



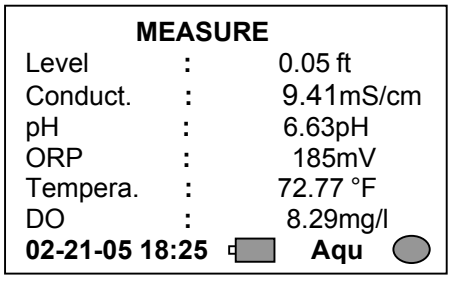
In Measure, pressing ENTER allows using the « SNAPCHOT RECORDING» mode. With this option, any time a value batch can be manually recorded in a file named by the user after confirmation by the ENTER key. An audible tone is heard when entering.
It is the only recording mode purely manual, others are automatic after starting.
Attention : This recording mode cannot be used when the Manual start and Program time modes have been programmed, as well as recording in progress under one of these modes.



Data are updated every 5 seconds. To enter a new value batch, press ENTER.
For recording in the same file, press ENTER successively two times (preserving thus the same file name). Recording is confirmed by an audible beep. The indications ⬇ and **Rec** are displayed at the bottom of the screen. To leave this mode and get back to the Main Menu, press Esc.
Icons ⬇ and **Rec** disappear then.

To get back to the Main Menu, press **Esc**.

2.4.2 FAST ADJUSTMENT OF THE ZERO FOR THE LEVEL SENSOR



In the continuous measuring mode the zero value of the level-sensor can be fixed before putting the probe in the water.
For this purpose, sensor in air, press successively **Del**

then **Zero :**

Warning : A zero-adjustment is impossible in the recording mode.

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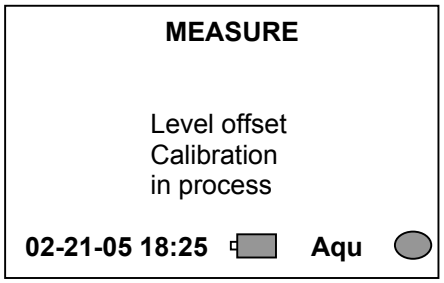
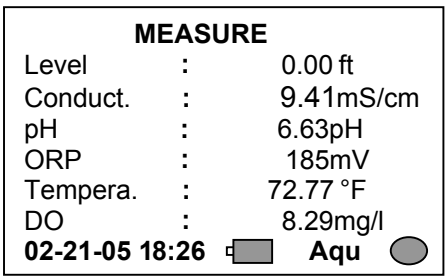


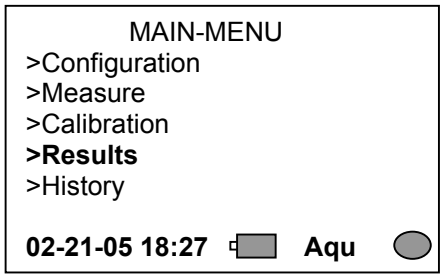
During calibration, this screen remains in operation for 5 to 10 seconds, according to the measuring cycle. The 6 parameters are displayed after calibration.
Warning :A zero adjustment is forbidden in recording mode.



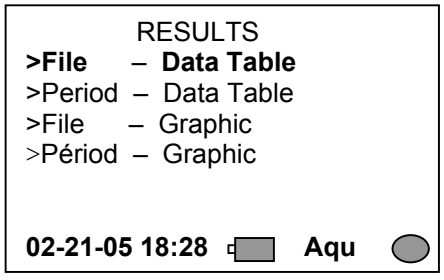
The level sensor now indicates **0 feet**.

2.5 RESULTS :

(Recording measures files)



Choose menu « **Results** » using the navigation keys and press Enter.



Choose section « **File – Data Table**» using the navigation keys and press Enter.

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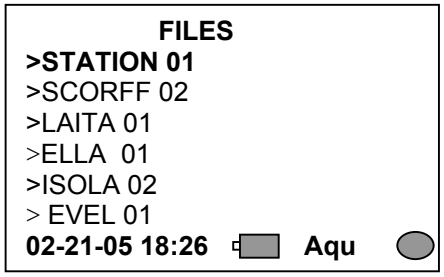
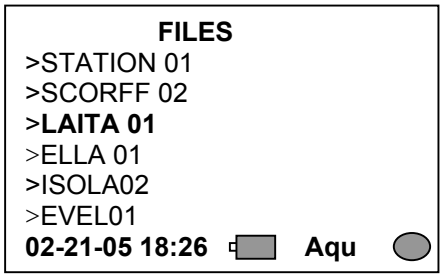
2.5.1 FILE – DATA TABLE:

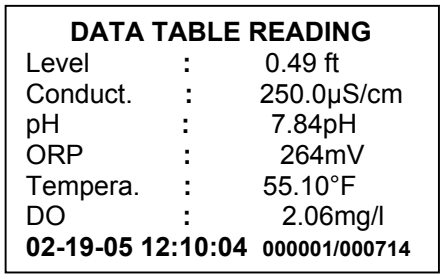


Choose section « **File – Data Table** » using the navigation keys and press Enter.

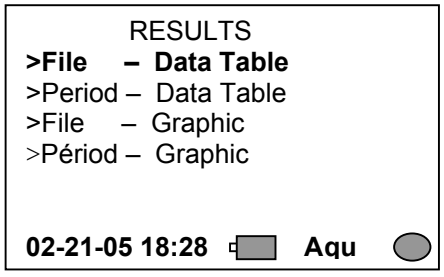


Choose the file to show using the navigation keys and press Enter.

Attention: You cannot create and therefore find in this register more than 16 recording files with the standard memory of 1MB.
An optional Flash memory of 8 MB is available, which allows you to create 128 files (very usefull in snapshots)



The status bar on the bottom of the screen indicates the precise recording starting date, hour,minute and second. The 2 values in the lower right corner indicate the rank of the values on the screen. In the example this means the first value of 714. The navigation keys allow you to move through the memory field. To get back to the Menu RESULTS, press twice **Esc**.



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2.5.2 PERIOD – DATA TABLE :

PERIOD

From : 02/18/05 – 12 : 10
To : 02/18/05 – 12 : 26

Validate by ENTER
02-21-05 18:29 **Aqu**

Starting and finishing date and time of events display can be chosen. Use the navigation keys to enter the dates.
No file is selected beforehand: you go directly in the period of a file, if it exists, otherwise beep of interdiction.

DATA TABLE READING

Level	:	0.49 ft
Conduct.	:	210.0µS/cm
pH	:	7.84pH
ORP	:	264mV
Tempera.	:	55.10°F
DO	:	2.06mg/l

02-18-05 12:10:04 **000001/000096**

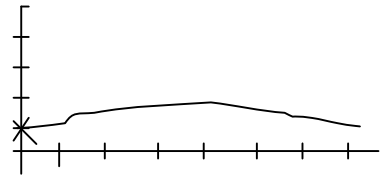
Using the right key allows you to display every measuring lot, from the beginning up to the finishing date.

2.5.3 FILE – GRAPHIC :

FILES
>STATION 01
>SCORFF 02
>LAITA 01
>ELLA 01
>ISOLA 02
> EVEL 01
02-21-05 18:35 **Aqu**

Choose the file to show using the navigation keys and press Enter.

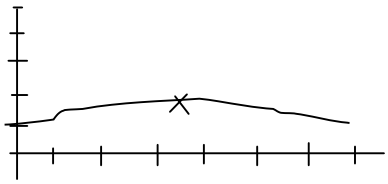
Level **0.50ft**



02-18-05 12:01:04 **000001/000714**

The first selected parameter shows with the current value in the upper right corner of the screen.
The status bar on the bottom of the screen indicates the precise recording starting date and time. The 2 values on the right give the rank of the shown values. In the exemple first value of 714.

Level **0.95ft**



02-18-05 12:31:44 **000357/000714**

The right and left navigation keys allow moving through the memory field. The crossed dot indicates the position of the current measure on the curve. Date and time of this measure is shown on the bottom of the screen. The counter on the right side gives the position of the memorized value.

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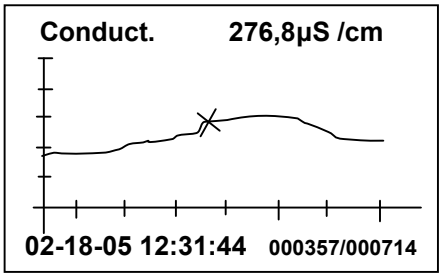
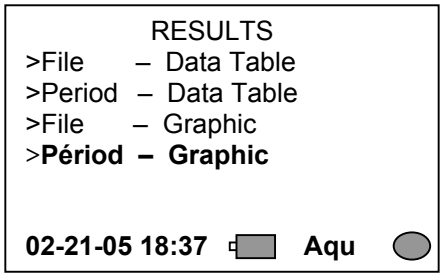
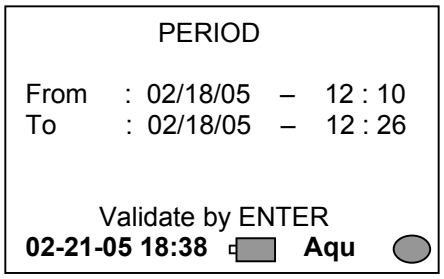


The up and down navigation keys allow visualising the different parameters.

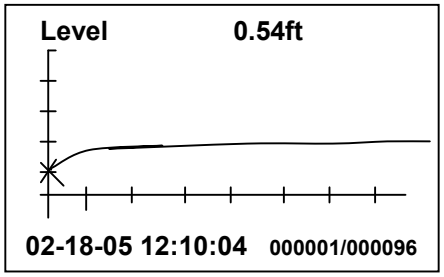


To get back to the « Results » menu, click the **Esc** button twice and select the desired column using the navigation keys .

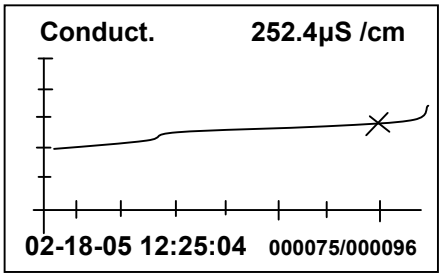
2.5.4 PERIOD – GRAPHIC :



Start and End date and time of graphic visualisation can be chosen For that purpose, use the navigation keys to enter the dates.
No file is selected beforehand: you go directly directly in the period of a file, if it exists, otherwise beep of interdiction.



The first selected parameter shows with the current value in the upper right corner of the screen.
The status bar on the bottom of the screen indicates the recording start date as well as the time on the second *precise.* The two values on the right give the order of the shown values. In the example : 1st value of a total of 96.



The up and down navigation keys allow visualising the different parameters.

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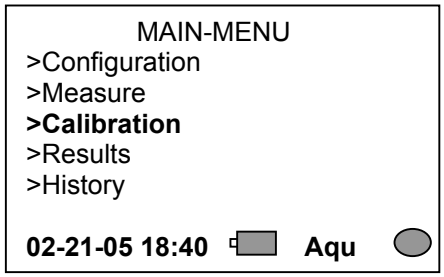
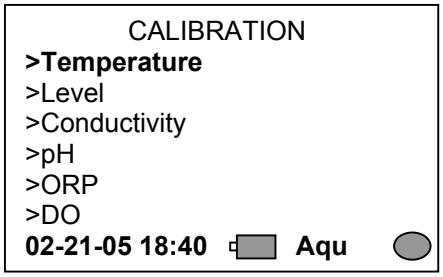
2.6 CALIBRATION



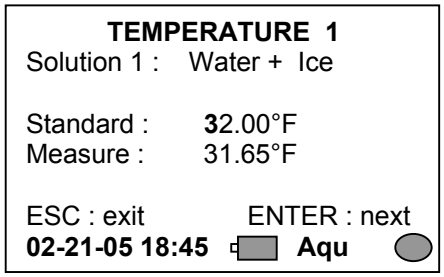
Choose the option « Calibration » using the navigation keys, and press enter.

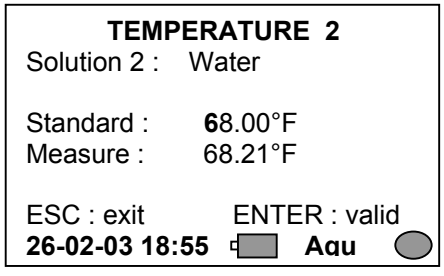


This menu gives access to the calibration of each parameter.

IMPORTANT : Start with the temperature sensor because this parameter is used in the calibration of conductivity and dissolved oxygen.

2.6.1 Temperature





Water** must be constantly **stirred** because of **temperature gradients.

Temperature : *factory calibrated original with higth précision.* This calbration is valid for more than one year.
Therefore: recalibrate the temperature only with very stable and homogeneous temperature standards. (Reference thermometer with 1/100 of degree °C résolution).

The probe is placed in an ice-bath to simulate a 32°F value (or 0°C if units SI selected).
Agitate continuously the probe in the middle.
As soon as the measure, given by the probe, is stabilised for at least 10 minutes, press Enter to validate the calibration .

Calibration in water of a stable temperature, with a value measured by a precision thermometer (between 68 °F and 104 °F , that it to say between 20 °C et 40 °C, depending of the preferential measure zone) .
Dip the probe in the water, while agitating continuously in the middle, and as soon as the measure, given by the probe, is stabilised for at least 10 minutes, press Enter to validate the calibration

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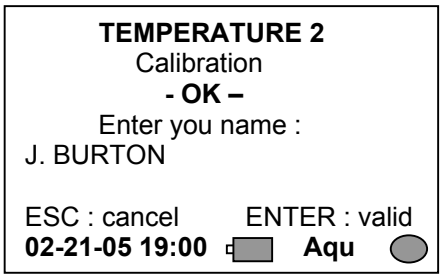
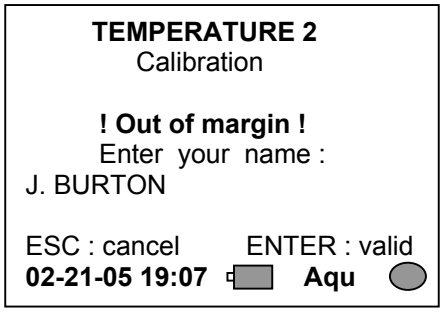
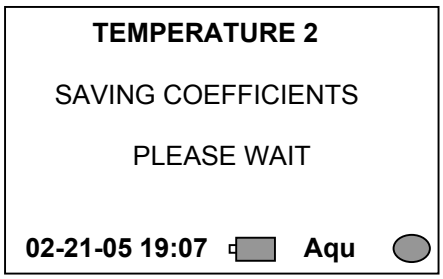


Message: correct calibration

Or



Message: incorrect calibration



At the end of the calibration process the name of the operator is asked. 20 characters are available to enter a name.
The following message appears: **-OK –**
The calibration is correct; validate to AQUA EEPROM the logging of the new zero and slope coefficients by ENTER.

The following message appears: **! Out of margin !**
Values are out range:
– Either the standard is incorrect (inversion or pollution).
– Or the sensor is faulty.
If the sensor seems good, recalibrate with new standards.
Sometimes, the sensor is just at the tolerated margin limit (**+/-5%**), and the measure is all the same correct. **You can disregard then and validate by ENTER .**
The sensor will be calibrated, and will deliver some correct values in Measure, but this sensor must be watched because maybe at end of life (example: strong shift on the pH 7 or too low Nernst slope).

After validation, the screen « *saving coefficients* » appears momentarily.

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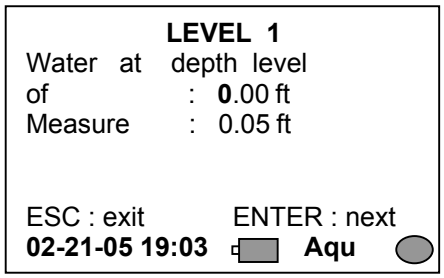
<u>Very important note</u>, which relates to all measured and posted parameters in calibration mode : Temperature, Level, Conductivity, pH, Redox (ORP), dissolved Oxygen (DO) :

In this « **Calibration »** mode, the values delivered by the sensors and posted on the right of **Measurement** are always automatically calibrated with **theoretical** coefficients of zeros and slope, which are beforehand recorded ex-works in AQUA, and cannot be changed or erased by end-users. Each type of sensor has specific theoretical coefficients. The **real** calibration coefficients with physicochemical standards (liquid or air) are always calculated with these theoretical coefficients and with the buffer values, which avoids risking to divide by zero or uncontrolled divergence (especially when proceding with previous erroneous calibrations because of pollution or buffers inversions).
After zero and slope calibrations, it is necessary to return in "**Measure**" mode to check the calibration quality : the value you read a few seconds later in "**Measure**" mode must coincide (with better than +-0,5%) with the value of the standard or the buffer in which the sensor soaks. Then the sensor is correctly calibrated with the real coefficients of zero and slope.

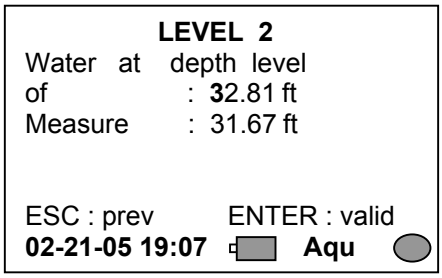
Now if you return again in « Calibration » mode for this parameter, do not be surprised to still find in the standards the same initial values, as if the sensor had not been calibrated, because again calibration in this mode is done with the theoretical coefficients, which never change.

These theoretical coefficients were statistically calculated by average of the characteristics of an important batch of representative sensors of a normal production. Calibrated with these theoretical coefficients, the sensors should ideally deliver correct values, but the variability of their initial characteristics (shift of the zero and sensitivity), like their ageing, clogging and poisoning, cause more or less important variation of the reading on the same standard between the measurement in "Calibration" mode (theoretical calibration) and the standard value. This variation makes it possible for the user to check the state of the sensor and the possible drift of its response in time. During their calculation, these real sensor coefficients are compared with the theoretical coefficients, and a message of suspicion can appear if the variation exceeds a certain predetermined percentage :
! Out of margin!. (tolerated spread from 5 to 50% according to the parameter).

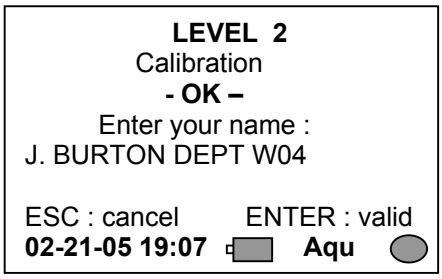
2.6.2 *Level*



While the water level sensor is in the air, press Enter to validate the Zero.



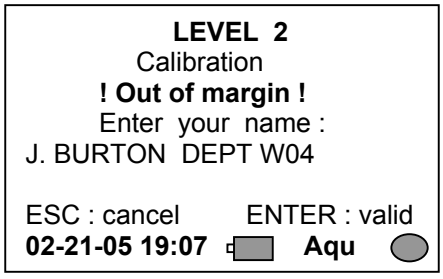
On this screen the software gives the possibility to calibrate the sensor in a known depth. Enter the value of the second calibration and place the sensor at the indicated level. As soon as the value, given by the sensor, is stabilised for at least 30 seconds, press Enter to validate.



Message: correct calibration

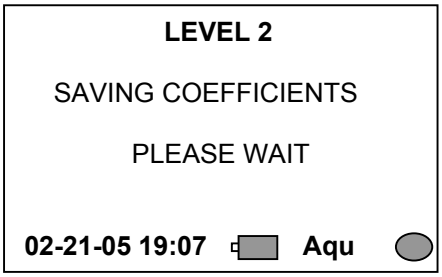
At the end of the calibration process the name of the operator is asked. 20 characters are available to enter a name.
The following message appears: **-OK –**
The calibration is correct; validate to AQUA EEPROM the logging of the new zero and slope coefficients by ENTER.

Or



Message: incorrect calibration

The following message appears: **! Out of margin !**
Values are out range:
– Either the standard is incorrect (inversion or pollution).
– Or the sensor is faulty.
If the sensor seems good, recalibrate with new standards.
Sometimes, the sensor is just at the tolerated margin limit (**+/-10%**), and the measure is all the same correct.
You can disregard then and validate by ENTER .
The sensor will be calibrated, and will deliver some correct values in Measure, but this sensor must be watched because maybe at end of life (example: strong shift on the pH 7 or too low Nernst slope).



After validation, the screen « *saving coefficients* » appears momentarily.

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2.6.3 *Conductivity*

CONDUCTIVITY SCALE
>0—200.0µS /cm
>0—2 000µS/cm
>0—20.00mS/cm
>0—200.0mS/cm

02-21-05 19:10 **Aqu**

Choose the measuring range in which you are going to work.

(Identical calibration procedure for every range)

CONDUCTIVITY 1
Range 0—200.0µS/cm
Probe in air
Standard : 0µS/cm
Measure : -0.2µS/cm
Tempera. 74.12 °F
ESC : exit ENTER : next
02-21-05 19:11 **Aqu**

The AQUA-sensor is placed in the air in order to reproduce the 0 µS (or mS) value.
As soon as the measure, given by the sensor, is stabilised for at least 30 seconds , press Enter to validate the 0µS calibration.

CONDUCTIVITY 2
Range 0—200.0µS/cm
Probe in solut.
Standard : **8**4.0µS/cm
Measure : 82.8µS/cm
Tempera. 74.14 °F
ESC : préc ENTER : valid
02-21-05 19:13 **Aqu**

Choose the adapted conductivity calibration solution in accordance with the desired calibration range:
0-200µS/cm 84µS
0-2000µS/cm 1 413µS
0-20mS/cm 12,880mS
0-200mS/cm 112,800mS
Dip the sensor in this solution. As soon as the measure, given by the sensor, is stabilised for at least 30 seconds, press Enter to validate the calibration value (ex. 84.0 µS/cm).

CONDUCTIVITY 2
Calibration
- OK –
Enter your name :
J. BURTON DEPT W04

ESC : cancel ENTER : valid
02-21-05 19:14 **Aqu**

Message: correct calibration

At the end of the calibration process the name of the operator is asked. 20 characters are available to enter a name. Then press ENTER :
The following message appears: **-OK –**
The calibration is correct; validate to AQUA EEPROM the logging of the new zero and slope coefficients by ENTER.

Or

CONDUCTIVITY 2
Calibration
! Out of margin !
Enter your name :
J. BURTON DEPT W04

ESC : cancel ENTER : valid
02-21-05 19:14 **Aqu**

Message: incorrect calibration

The following message appears: **! Out of margin !**
Values are out range:
– Either the standard is incorrect (inversion or pollution).
– Or the sensor is faulty.
If the sensor seems good, recalibrate with new standards.
Sometimes, the sensor is just at the tolerated margin limit (**-50,+100%**), and the measure is all the same correct. **You can disregard then and validate by ENTER .**
The sensor will be calibrated, and will deliver some correct values in Measure, but this sensor must be watched because maybe at end of life (example: strong shift on the pH 7 or too low Nernst slope).

CONDUCTIVITY 2

SAVING COEFFICIENTS

PLEASE WAIT

02-21-05 19:14 **Aqu**

After validation, the screen « *saving coefficients* » appears momentarily.

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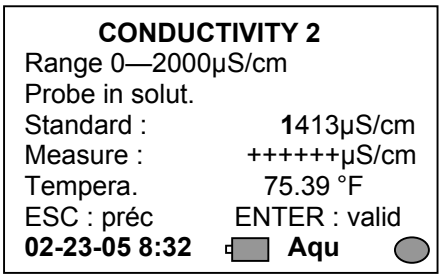
IMPORTANT REMARK: If in the fields Measure shows off ++++++ µS/cm or ++++++ mS/cm, it means that the conductivity standard solution has a too elevated value for the selected range (signal saturated). Choose a weaker value standard appropriated to the range under calibration.



In this overflow case the standard is for example 12 880µS/cm, too strong a value for this range.

ATTENTION : This indication of range overtaking doesn't exist in perpetual Measures and Recording, and is noticeable only by the presence of a steady enough signal :
values : 200 µS/cm ± 10 %, ou 2000 µS/cm ± 10 %, ou 20mS/cm ± 10 %, ou 200mS/cm ± 10 %.

These values risking to be mistaken as measures, it is strongly recommended to work, during the recordings, with the automatic range, in order to avoid a possible saturation on a no automatic range .

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2.6.4 pH

PH1

Probe in
Buffer 1 : **7**.01pH
Measure : 6.97pH
Tempera. 73.89 °F
ESC : exit ENTER : next
02-21-05 19:15 **Aqu**

Choose the measuring range in which you are going to work.
(Identical calibration procedure for every range)

1°) Calibration with a buffer solution pH7
Dip the probe in the calibration solution.
As soon as the measure, given by the probe,is stabilised for at least 30 seconds, press Enter to validate the calibration.

PH2

Probe in
Buffer 2 : **4**.01pH
Measure : 4.08pH
Tempera. 73.82 °F
ESC : exit ENTER : next
02-21-05 19:16 **Aqu**

2°) Calibration with a buffer solution pH4, pH9 ou pH10.
Enter the value of the used solution. Dip the probe in this solution.
As soon as the measure, given by the probe,is stabilised for at least 30 seconds, press Enter to validate the calibration.
Nota: standard solutions are worth precisely pH 7. 01 and pH 4. 01 at 25 °C/ 77 °F

At the end of the calibration process the name of the operator is asked. 20 characters are available to enter a name. Then press ENTER :
The following message appears: **-OK –** In that case **the calibration is correct :**
Validate to AQUA EEPROM the logging of the new zero and slope coefs by ENTER.
The following message appears: **! Out of margin !** In that case **values are out range:**
– Either the standard is incorrect (inversion or pollution).
– Or the sensor is faulty. If the sensor seems good, to redo a calibration with new standards. Sometimes, the sensor is just at the tolerated margin limit (**+/-35%**), and the measure is all the same correct. **You can disregard then and validate by ENTER .** (Strong shift on the pH 7 or too low Nernst slope). After validation, the screen « *saving coefficients* » appears momentarily.

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2.6.5 ORP

ORP 1

Auto 0

Measure : 3mV

ESC : exit ENTER : next
02-21-05 19:17 **Aqu**

The AQUA probe is placed in the air and a short-circuit is applied to the ORP sensor in order to simulate the value 0mV. Place the probe at free air and follow the evolution of the measure. As soon as the measure given by the probe is stabilized since at least 30 seconds, press the key ENTER to validate the calibration.

REDOX 2

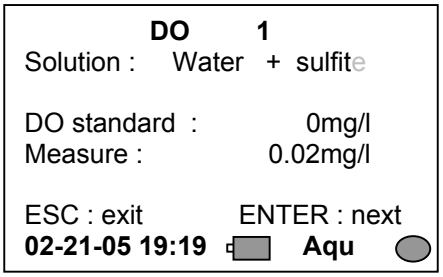
Probe in
buffer : **2**40mV
Measure : 245mV

ESC : prev. ENTER : valid
02-21-05 19:17 **Aqu**

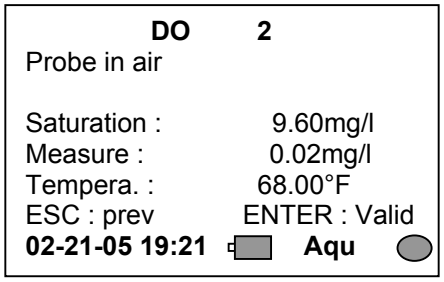
Calibration with a buffer solution of 240 or 470mV according to the zone of measure.
Enter the value of the used calibration solution. Dip the probe in this solution.
As soon as the measure, given by the probe, is stabilized since at least 30 seconds, press Enter to validate the calibration.

At the end of the calibration process the name of the operator is asked. 20 characters are available to enter a name. Then press ENTER :
The following message appears: **-OK –** In that case **the calibration is correct :**
Validate to AQUA EEPROM the logging of the new zero and slope coefs by ENTER.
The following message appears: **! Out of margin !** In that case **values are out range:**
– Either the standard is incorrect (inversion or pollution).
– Or the sensor is faulty. If the sensor seems good, to redo a calibration with new standards. Sometimes, the sensor is just at the tolerated margin limit (**+/-25%**), and the measure is all the same correct. **You can disregard then and validate by ENTER .** (Strong shift on the pH 7 or too low Nernst slope). After validation, the screen « *saving coefficients* » appears momentarily.

2.6.6 DO (Dissolved Oxygen)



The probe is placed in a solution of water and sulphite at DO = 0,00mg/l .
As soon as the measure, given by the probe, is stabilised for at least 30 seconds, press Enter to validate the calibration .



Calibration in the air: Using the atmospheric pression and temperature measures, the Acteon terminal determines the value of the air saturation. The probe being in the air, wait for the measure, given by the probe, to be stabilised for at least 30 seconds, then press Enter to validate the calibration.

At the end of the calibration process the name of the operator is asked. 20 characters are available to enter a name. Then press ENTER :
The following message appears: **-OK –** In that case **the calibration is correct :**
Validate to AQUA EEPROM the logging of the new zero and slope coefs by ENTER.
The following message appears: **! Out of margin !** In that case **values are out range:**
– Either the standard is incorrect (inversion or pollution).
– Or the sensor is faulty. If the sensor seems good, to redo a calibration with new standards. Sometimes, the sensor is just at the tolerated margin limit (**-25, +35%**), and the measure is all the same correct. **You can disregard then and validate by ENTER .** (Strong shift on the pH 7 or too low Nernst slope). After validation, the screen « *saving coefficients* » appears momentarily.

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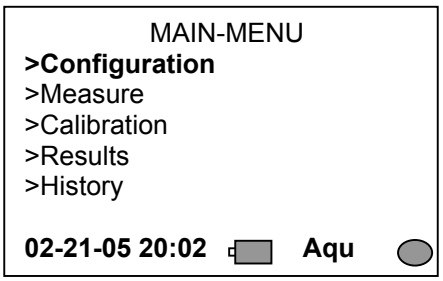
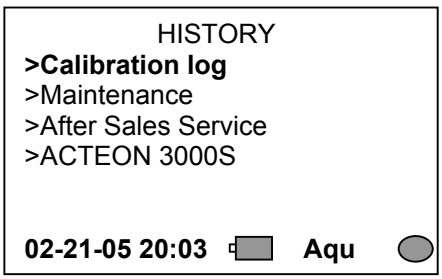
2.7 History

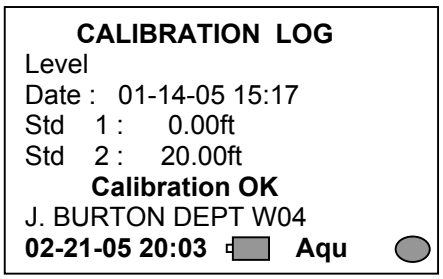


The user can get access to different kind of information through the option History
Choose the option History in the MAIN MENU and validate by pressing Enter.



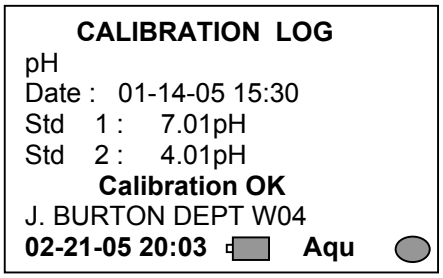
Choose the desired option using the navigation keys and validate your choice pressing Enter.

2.7.1 Calibration Log

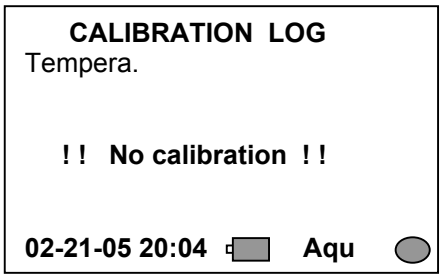


The calibration log gives you the following informations :

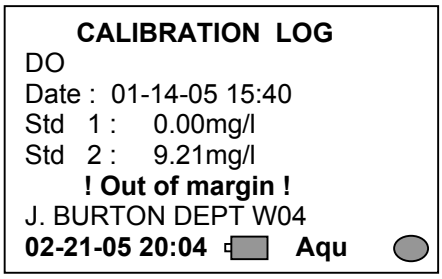
- Name of the calibrated parameter
- Date of the last calibration
- Standard 1 and Standard 2
- Operator name
- Calibration status :
  - **Calibration OK**
  - **! Out of margin !**
  - **! ! No calibration ! !**



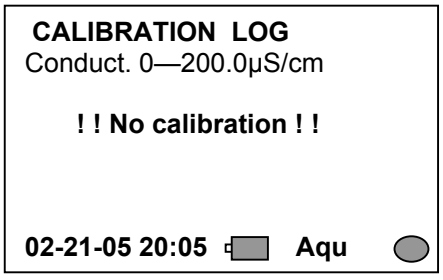
The navigation keys allow to visualise the different parameters.



In this example, temperature sensor calibration needs to be done.



In this example, Dissolved Oxygen sensor calibration is soiled of suspicion and needs to be redone (standard mistake or sensor in question).



In this example, conductivity sensor calibration on the range 0—200.0µS/cm needs to be done.

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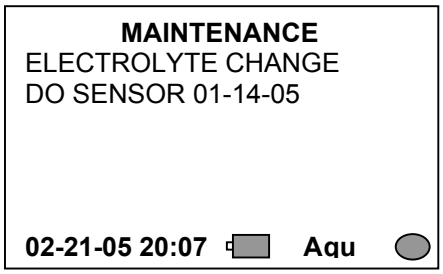
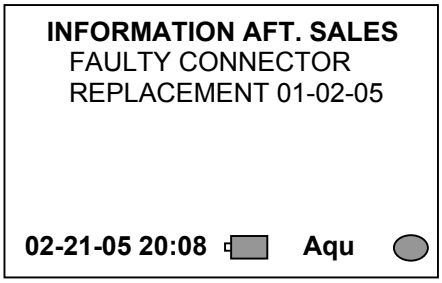
2.7.2 Maintenance



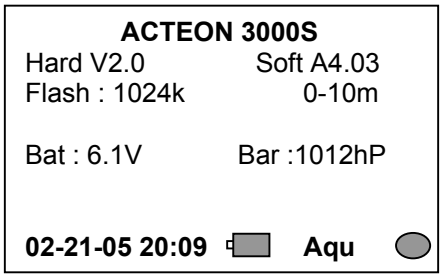
In this history the user can make notes concerning maintenance performed. 126 alphanumeric characters are available for a description of the actions taken.

2.7.3 AFTER SALES SERVICE



The after sales informations reserved for factory interventions. Only one access code gives access to the information registered in this history.

2.7.4 ACTEON 3000S



This screen gives information concerning hardware characteristics and Acteon software version. It shows installed memory capacity (1024kB until 8MB), the variant of the depth sensor (0-10m ; 0-50 m),as well value of battery voltage, values of the internal barometric pressure sensor.

a CONTRAST-BRIGHTNESS CONTROL

In this last page, the contrast of the LCD screen can be adjusted using the keys number 7 and 9.

- Key 7 : less contrast
- Key 9 : more contrast

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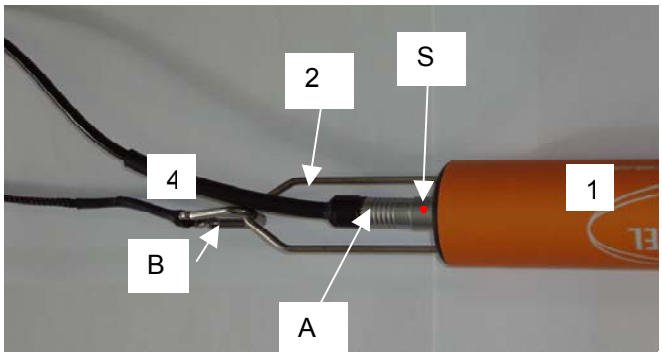
3. PUTTING INTO SERVICE

3.1 CONNECTIONS

3.1.1 AQUA PROBE

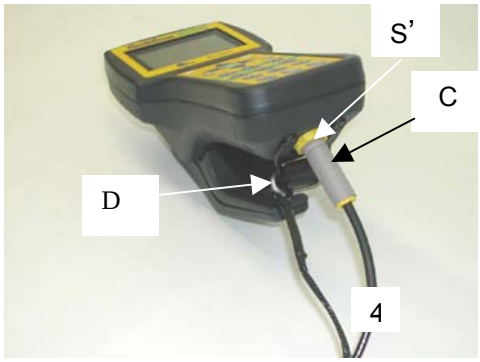


Take the AQUA probe 1 and cable 4

Make coincide the red point of the plug A with the red point of the socket S (4-points connector), then connect while pushing until the click.
Fix the clasp B on the steel handle 2 for the resumption of effort of the cable. Attention: Not to use the cable as carrier.

To disconnect the cable of the AQUA probe, pull on the metallic body of the plug A (all effort to pull on the cable is self-locking).

3.1.2 TERMINAL ACTEON



Take ACTEON Terminal 2 and cable 4

Make coincide the arrow of the grey plug C with the arrow of the yellow socket S' (12-points connector), then connect while pushing until the click.
Fix the shackle D on the handle in Velcroc® for the resumption of effort of the cable. Attention: Not to use the cable in carrier.

To disconnect the cable of the terminal Acteon, pull on the grey body of the plug C (all effort to pull on the cable is self-locking).

3.2 STARTING UP

Unscrew the preservation case E from the AQUA and replace by ballasted strainer 3.

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To check the functioning of the set, carry out a test by plunging the AQUA probe in a bowl of tap water.

- Press key I in the left upper corner of the keyboard for powering up.
- In the configuration menu, adjust date and time if necessary and check the chosen parameters (p.5)
- Reset to zero the memory and choose fixed or rotating memory (p.14)
- Go back to the general menu and choose the option «MEASURE » perpetual measuring (p 18)

MEASURE		
Level	:	0.39 ft
Conduct.	:	567.4µS/cm
pH	:	7.93pH
ORP	:	175mV
Tempera.	:	60.07 °F
DO	:	8.23mg/l
02-22-05 08:03		**A↓ Aqu**

Check the coherence between the different parameters.
If necessary, carry out a calibration of the sensors (see p. 24 to 28)

- Before carrying out measurements, choose the recording mode Manual start and file name (pages14 to 16)
- Once in the field, proceed to perpetual measuring (p 18)
- Make zero of the level sensor before plunging the probe (p19)
- Pressing ENTER in this option will start the recording of data (**A↓)**.
- Go back to **Configuration** option at the end of the measuring session, then **Recording** and confirm « **Stop recording** » (p.18)

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4. ACTEWIN DATA-HANDLING SOFTWARE

With ACTEWIN one can connect a PC indifferently to the portable terminal ACTEON as well as to the AQUA probe using the Actewin SDI12/RS232 adapter and specific connection cables.

Following options are available:

PC⇔ACTEON

- Import of data [measures] (ACTEON 3000 ⇒ PC) + graphic/statistic exploitation
- Programming logger (PC ⇒ ACTEON 3000)
- Export of recording configurations (PC ⇒ ACTEON 3000)

PC⇔AQUA

- Calibration (PC ⇒ AQUA)
- Measure (AQUA ⇒ PC)

Installing and execution of ACTEWIN software under Windows.

Installation of ACTEWIN software requires 2MO of free memory space.
Insert the installation CD in your CD-ROM reader; the « Autorun » option will start automatic installation.
During installation, you will be asked to choose an installation language (French is the standard language), to register client information (user name, company name), and a file location and name to save the software will be proposed.
Follow the instructions that appear on the screen to finish installation.
At the end, an icon for the program Actewin V2.X is placed automatically on the desktop.

Before starting the software application, connect the AQUA multiparameter probe to a PC through the communication cable. Select the ACTEWIN icon on your desktop or in the program menu of your hard disk. Once the program ACTEWIN is launched, the software (ACTEWIN on PC) will initiate its communication with the software situated in the AQUA 100 probe through SDI-12 standard.

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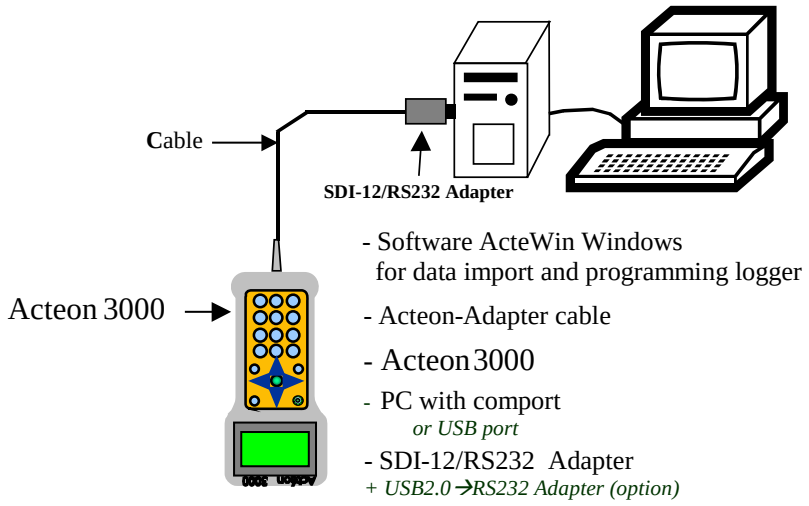
Acteon 3000 terminal connected to a computer



5. AQUA PROBE

5.1 Starting up the probe

The AQUA multiparameter probe can be connected to 3 sensors, enabling measuring up to 6 parameters:

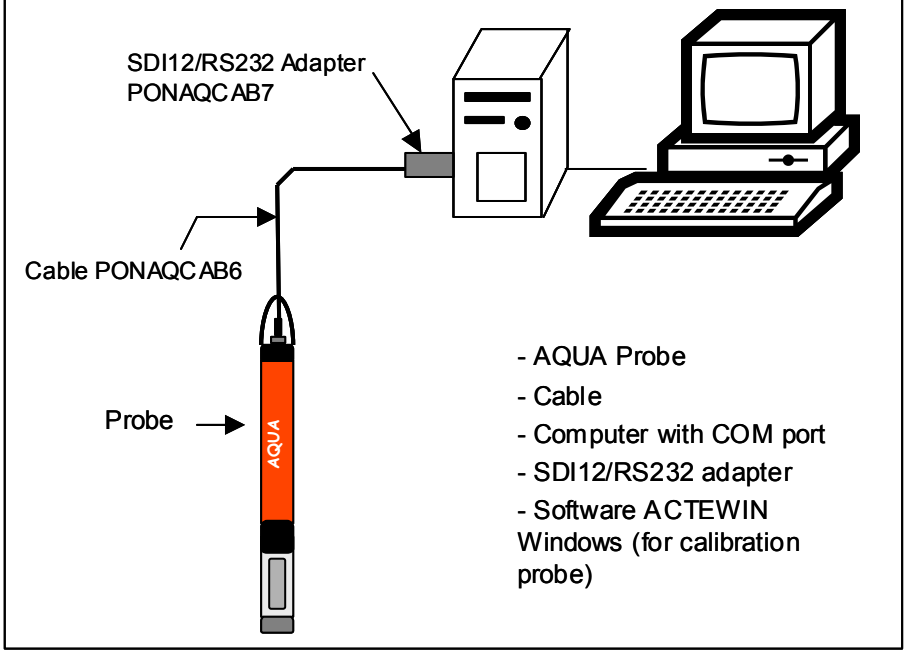
- Dissolved Oxygen (Red sensor).
- pH
- ORP (Blue sensor)
- Temperature
- Conductivity (Grey sensor)
- Pressure (situated in the sleeve of the AQUA10/ AQUA 50).

5.2 Connecting the probe

The AQUA probe can be connected to PC and data collection devices as well as to the ACTEON 3000 display/recording terminal (SDI-12 BUS via RS 232).

The following figures show various configurations with its necessary equipment.

Probe connected to a computer



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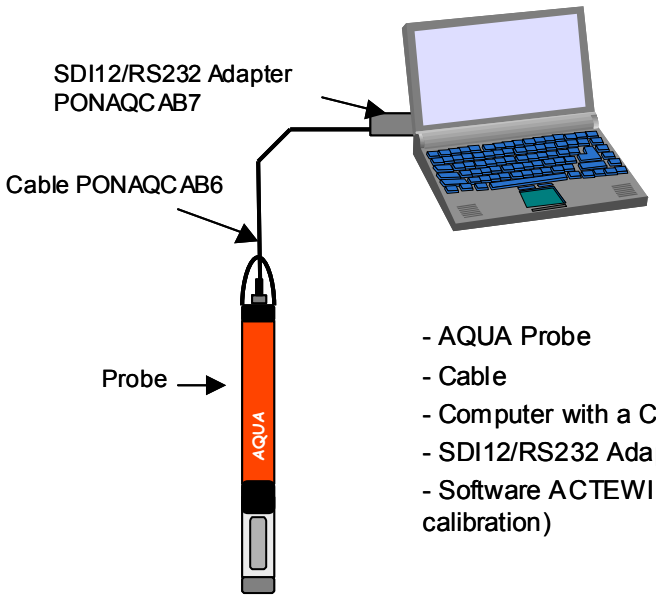
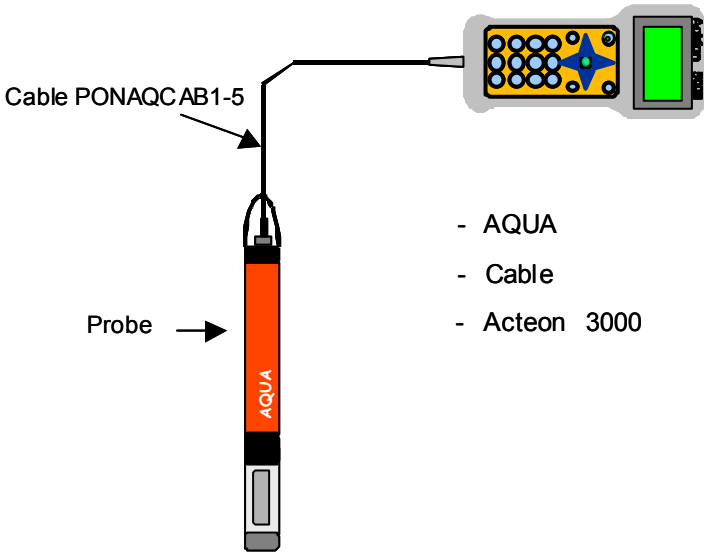
Probe connected to a laptop computer



- AQUA Probe
- Cable
- Computer with a COM port
- SDI12/RS232 Adapter
- Software ACTEWIN (for probe calibration)

Probe connected to ACTEON 3000 terminal



- AQUA
- Cable
- Acteon 3000

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5.3 Preparing the probe

5.3.1 Installing the dissolved oxygen membrane.

The DO probe is shipped 'ready to use', with the oxymetric electrolyte and a protective membrane already installed on the sensor.

If only the membrane rack is installed, follow the next steps to put the oxygen sensor in operation:

1- Unscrew the protective cap 'c' and remove the membrane rack without touching the cathode.

***Warning*: Don't put anything in the opening of the pressure stabiliser (see Figure 1).**

2- Keep the sensor in vertical position and rinse the tank with some drops of electrolyte. Fill the tank with the oxymetric electrolyte until a meniscus is forming on the top part of the sensor. Make sure that no air bubbles are retained on the cathode.

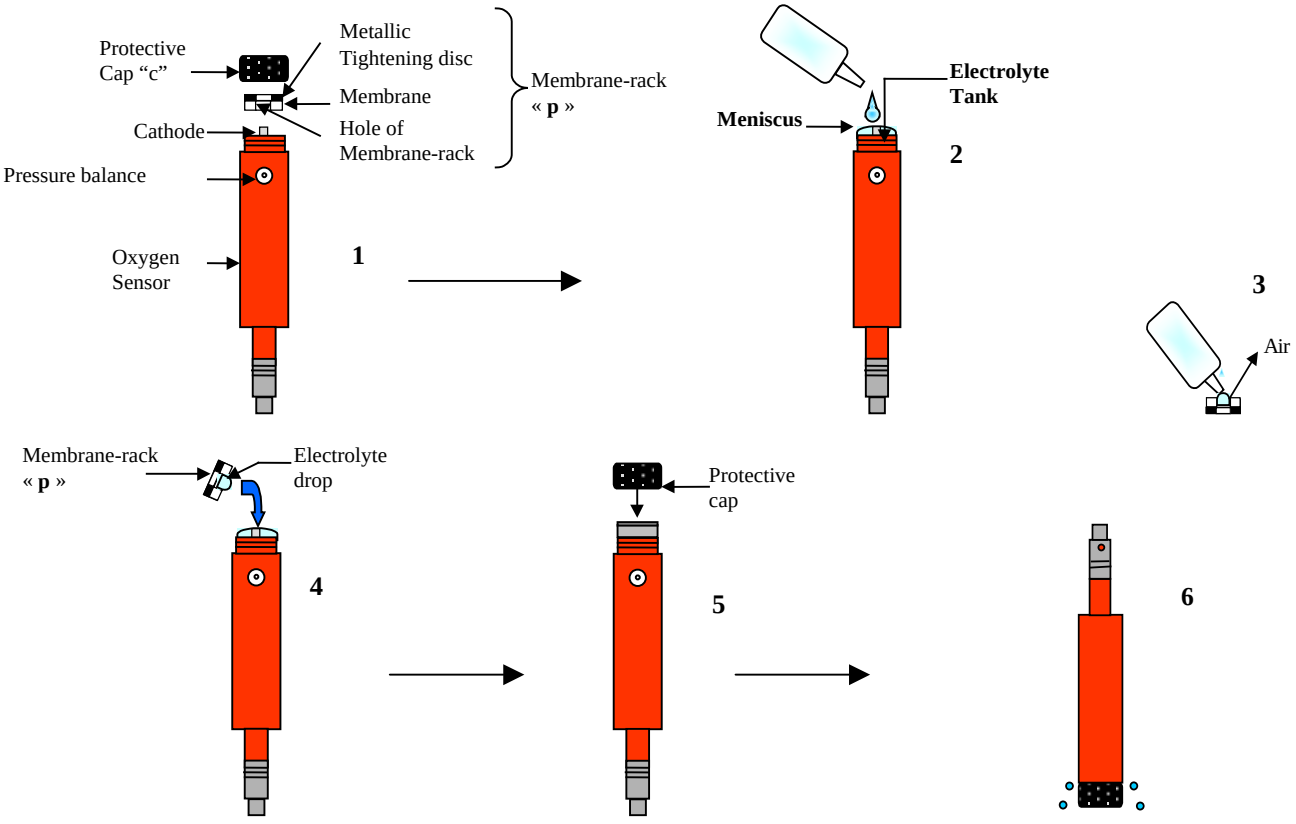
3- Take out the air of the membrane rack with one drop of electrolyte.

4- Place the membrane rack in the tank.

5- Screw the protective cap slowly back on the sensor end without forcing.

6- Turn the sensor around and screw the cap gradually to take out the electrolyte excess.

7- Check that no airbubbles are left on the cathode.



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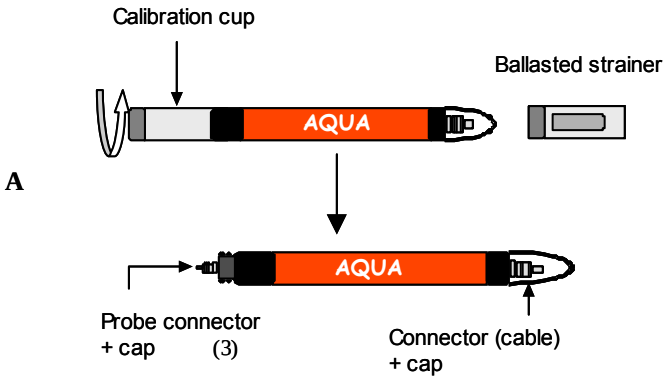
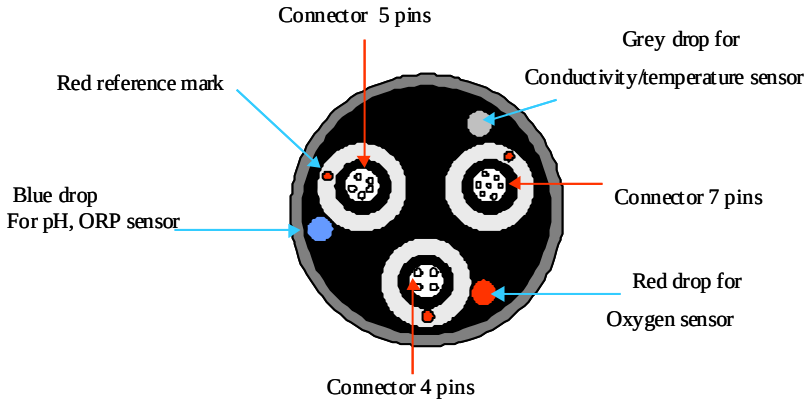
5.3.2 *Installing the sensors.*

A- Unscrew the calibration cap and take it off of the probe to get access to the sensor connector.



B- Take off the protective caps installed to the probe connectors by pulling them.

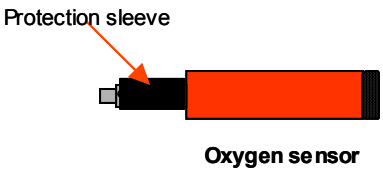
C- Hold the sensors by the ring and 'click' them to the probe connector. Coloured drops, corresponding to those on the sensors, are placed on the AQUA probe compartment.
The red reference marks on the sensor and probe compartment help you to place the sensors correctly *(see compartment schedule*).



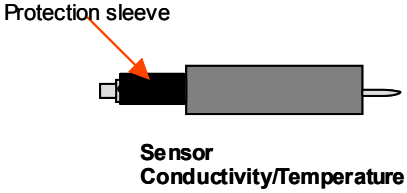
Schedule AQUA probe compartment.

Sensor-Pods :

- The dissolved oxygen sensor is red and is connected to the 4-pin-probe connector.



- The temperature/conductivity sensor is grey and is connected to the 7-pin-probe connector.



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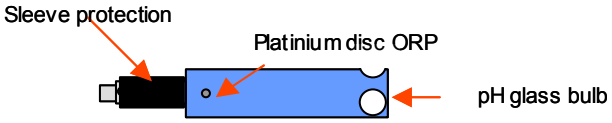
- The pH/ORP sensor is blue and is connected to the 5-pin-probe connector.



pH ORP sensor

Before installing the sensors, make sure that the sensor and AQUA connectors are absolutely clean. The openings for connecting the sensors must be completely dry. In case of humidity, use a compressed air spray to dry the openings.

Installing the sensors is done as follows:

- Hold the sensor by the ring and locate the place of the sensor using the coloured drop of the compartment.
- Place the sensor on top of the compartment opening.
- Insert the sensor into the opening until hearing a soft 'click', meaning that the sensor is correctly installed.

5.3.3 Installing the ballasted strainer and the calibration cap.

The AQUA probe is equipped with a ballasted strainer and with a calibration cup that also serves as a protection case. As soon as the sensors are installed, screw ballasted strainer (or the calibration cup) clockwise on the compartment of the probe.

5.3.4 Installing the cable.

Remove the protective cap on the top end of the AQUA probe and place the cable connector opposite of the probe opening so that the two red marks (one on the cable ring and one on the probe connector) touch. Insert the cable until hearing a soft 'click', meaning the cable is correctly installed.

5.4 Maintenance of the probe

The maintenance of the sensor, which will increase its lifetime on one hand and will reduce preparation time for future use of the AQUA on the other hand, is presented in this part of the manual.

This paragraph also explains storing conditions for shorter or longer periods of time (up to several months).

Before starting the installation of a sensor or cap on the sensor port, make sure that the two connectors that will touch are perfectly dry to prevent water from coming in these connectors.

- If humidity is detected, dry the connector using compressed air.
- If the connector is corroded, send the connector back to the after sales services of '**Ponsel**' (NEOTEK division).

The connector that links the AQUA probe to a cable must remain permanently covered to protect it against humidity. Traces of humidity can be taken away using compressed air.

When the probe is in communication, a cable must have been connected beforehand. Likewise, when the probe is not in communication, a cap that is placed in the connector opening replaces the cable. This cap can be easily removed by pulling it lightly.

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5.5 Maintenance of the sensors.

5.5.1 Dissolved Oxygen sensor.

When the sensor is used for a longer period of time, change the oxymetric electrolyte and the membrane at least once a month.

Furthermore, the electrolyte and membrane must be replaced in the following cases:

- Presence of bubbles under the membrane,
- Presence of electrolyte sediment (white) on the membrane,
- The sensor shows unstable measurements, a doubtful 0 calibration.

5.5.2 Conductivity/pH/ORP sensor.

Cleaning of the sensor becomes essential as soon as sediments or pollution appear on the glass surfaces, on the platinum point, on the conductivity cell, or when the response of one of those elements slows down.

1) Disconnect the sensor from the AQUA-probe (by holding the probe by its ring while pulling) and proceed cleaning the glass bulb, the platinum point and the conductivity cell with clear water and a soft cloth or a cotton-bud. After that, check the measuring of every parameter before starting measuring again.
2) If the results of one of the sensors pH, ORP or conductivity are not satisfactory, carry out the following procedures :

a- Soak the sensor for 15 minutes in a solution of water with a detergent; Bleach 10% or Mercryl.

b- Clean with precaution the glass bulb, the platinum point and the conductivity cell with a cotton-bud, soaked beforehand in a solution of water with some drops of dishwasher liquid.

c- Rinse the sensor with clean water, clean it with a wet cotton-bud, and rinse again in a bowl of clean water.

d- Check the functioning of the sensor and carry out calibration of the pH, ORP and conductivity parameters. Before placing back the sensor on the AQUA probe, make sure that the connectors are perfectly dry. If necessary, take off humidity traces using compressed air.

3) Sand the ORP sensor (platinium disc) with a 500 abrasive, wetted with a measuring standard.

5.5.3 Temperature sensor.

This sensor doesn't need any specific maintenance and can be simply cleaned with a solution of water with some drops of dishwasher liquid as soon as sediment traces appear.

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5.6 Storage conditions for AQUA probe.

5.6.1 Short term storage.

For short-term storage, leave the sensors connected to the AQUA probe under a humid atmosphere according to one of the following methods:

1) Put approximately 5 mm of initial preservation orangey liquid[1] in the preservation cap and place it on the probe head. The sensors should not be submerged.
2) Place a humid sponge or cotton disc (thickness 5 mm) impregnated with preservation orangey liquid to the bottom of the preservation cap and screw it on the probe head.

In both cases, make sure that the preservation cap is hermetically closed to avoid any evaporation.

Noted : If you no longer have preservation orangey liquid (Ref. : PON-SOL-CSV), use the oxymetric liquid (electrolyte KCL Ref. : PON-02-EL). Especially : no distiled or pure water, or then 5 drops to the bottom of the cap, only to maintain a climate of humidity on sensor heads .

The communication cable of the probe must be removed and replaced by a small protection cap (delivered with probe) to avoid humidity from entering the connector opening.

Storage rules are thus as follows:

- Use a quantity of liquid that is enough to provide humidity **but not so much that it reaches the sensor surfaces, especially if the liquid is pure water →in this case, premature salt depletion of the Plastogel reférence Ag/AgCl on the Pod sensor pH/ORP).**
- Check that the conservation cap is hermetically closed to reduce the risk of evaporation.
- Check regularly that humidity is maintained in the cap.

5.6.2 Long term storage.

a Dissolved Oxygen sensor.

- Disconnect the dissolved oxygen sensor, take off the membrane and empty the oxymetric electrolyte.
  Rinse the electrolyte tank with distilled water and dry with compressed air. Keep the sensor dry and without the membrane or with a membrane in order to protect the cathode.
- Place a small protection cap on the opening of the probe connector that is meant to receive the oxygen sensor to avoid humidity from coming in.

b Conductivity/pH/ ORP and temperature sensors.

- Disconnect the conductivity sensor, rinse it with water and dry with compressed air. Keep the sensor dry.
- pH/ORP sensor may remain connected to the AQUA-probe. Follow the same instructions as for short term storage using the preservation orange liquid. Attention ! : before, push in the waterproof obturating plugs of sensor-Pods oxygen and temperature /conductivity.

Screw the preservation cup completely to avoid any evaporation.

Preservation liquid :Ref. : PON-SOL-CSV

[1] **The preservation orangey liquid is provided with the probe AQUA in the preservation cap. Not to throw it : keep this liquid preciously in a hermetic bottle. Otherwise available on order: Ref : PON-SOL-CSV . This liquid contains KCL saturated at 0 °C, products fongicide, anti biofouling, anti evaporation, does not freeze over -50 °C, and is a pH buffer, value between pH4 and 5, salinity >200mS/cm. No toxic, it regenerate partially in some days the reference Plastogel Ag/AgCl pH/ORP in case of salt exhaustion.**

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5.7 Calibration of the AQUA probe.

5.7.1 Recommendations.

• *Security.*

WARNING: Certain reagents that are used for the calibration of sensors are health threatening and handling them requires specific safety measures (see Appendix 1).

• *Calibration with calibration cup or vessel.*

The preservation case that comes with the AQUA probe can also be used as a calibration cup in order to optimise the volumes of the used standards, protecting the sensors…

The optimised volumes that allow a correct calibration for each sensor are noted in the table below:

Sensor to calibrate	Vertical position
pH/ ORP	50 ml
D.Oxygen	50 ml
Temperature	50 ml
Conductivity	50 ml

Table 1: Optimised standard volumes.

Calibration of the AQUA probe can also be done with a vessel. In that case, several precautions need to be taken:

- Carry out all the calibrations with the ballasted strainer to protect the sensors and take off the stainless steel ballested tip.
- Fix the body of the probe to avoid falling for the majority of the vessels have convex bottoms.
- Numerous calibrations integrate different factors from other sensors (like temperature), so make sure that all the sensors are submerged at the time of a calibration procedure. Also, see that the calibration standard volume reaches the connectors.

• *Optimise the effectiveness of a calibration.*

- To optimise the accuracy of the calibration procedure, rinse the probe with a small volume of calibration standard, planned for the calibration, and collect this volume in the calibration cap to rinse. Don't throw away old calibration solutions because they can be used for this rinsing.
- Prepare a bowl of water at room temperature to rinse the sensors and the calibration cup after every calibration procedure.
- Prepare absorbent paper to dry the sensors and the preservation case every time you rinse the sensors with water or the calibration standard. This is to avoid contamination of the calibration standard and will increase the accuracy of the calibration.
- If one or more sensors are disconnected from the AQUA probe, make sure that the electric connections are watertight by placing the small protection caps that were designed for this purpose.
- Submerge the sensor head completely in the standard before validating the calibration procedure.

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5.8 Calibration procedures.

5.8.1 General schedule.

The following calibration procedures concern the sensors connected to the AQUA probe, corresponding to the following parameters:

- Temperature (°C or °F).
- Conductivity (µS or mS).
- pH (pH unit).
- ORP (mV).
- Pressure(depth/Level) (measuring of depth in cm, m, in or ft).
- Dissolved Oxygen (mg/l).

⇒ To increase the accuracy of the calibration procedure, rinse the calibration cap with water followed by a small amount of 'calibration solution' corresponding to the sensor that is to be calibrated. Throw away this rinsing volume and pour in the calibration cup the optimised calibration solution (see Table 1).

⇒ Submerge the sensors with precaution in this standard and screw the calibration cap on the AQUA 100 probe head. Don't forget to tighten the probe body to avoid it from falling.

⇒ Once the sensor is submerged, shake the probe in an up-down movement (or left-right) to take out eventual sensor bubbles.

⇒ Start the ACTEWIN-software (see chapter 1) and select the option "AQUA" followed by "Calibration". The screen will show the list of sensors connected to the AQUA that can be calibrated.

⇒ Select the sensor to calibrate and follow the instructions on the screen:

➢ **Screen 1:** Presents the different calibration steps (2 for each sensor) and indicates which standard to use.

Navigation keys:

"**Next**" To pass to the next screen and to carry out the first calibration.

"**Cancel**" To quit the calibration procedure.

➢ **Screen 2:** First calibration step.

- Select the parameter unit (fixed unit or initialised; could be modified by following menu instructions).
- Enter the value of Standard 1 (fixed or initialised value that can be modified).
- The measure given by AQUA is shown in real time ("**Measure**" box). When this measure is stabilised for at least 30 seconds, confirm the first calibration procedure with the « **Validation** » symbol.
- In the « **Report** » box a message will appear indicating if the calibration procedure is confirmed or suspect.

  Navigation keys:

  "**Previous**" To get back to the first screen.

  "**Next**" This option can only be chosen if the first calibration step is confirmed and allows passing on to the next screen to carry out the second calibration.

  "**Cancel**" To leave the calibration procedure.

Unscrew the calibration cap and take the sensors out of the first calibration standard. Rinse the sensors and the calibration cup with water followed by a small quantity of the second calibration standard.

➢ **Screen 3:** Second calibration step.

- Select the parameter unit (fixed or initialised; could be modified by following menu instructions).

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- Enter the value of Standard 2 (fixed or initialised value that can be modified).
- Submerge the sensors in this second standard and follow the development of the measure given by AQUA 100. When this measure is stabilised for at least 30 seconds, confirm the second calibration procedure with the « **Validation** » symbol.
- The "**Report**" box indicates if the calibration procedure is confirmed or suspect.

Navigation keys:

"**Previous**" To go back to the second screen.

"**Next**" This option can only be chosen if the second calibration step is confirmed and allows passing to the next screen to see the final report.

"**Cancel**" To quit the calibration procedure.

➢ **Screen 4**: Gives a summary of the taken actions during the calibration steps indicating if the calibration of the sensor has functioned well or if one of the procedures needs to be repeated (indicates which standard to repeat).

Navigation keys:

"**Previous**" To go back to the third screen.

"**End**" To confirm the calibration of the sensor and to bring you back to the screen showing the list of sensors. Note: Calibration can be confirmed even if the report indicates that it is suspect.

"**Cancel**" To quit the calibration procedure.

The sensor calibration procedure is only confirmed if the two steps have been carried out and are confirmed.

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➢ **Sensor display screen**

Every sensor that needs to be calibrated is represented by a symbol and its calibration status is indicated as follows:

→ : The sensor has not been calibrated.

4: Calibration of the sensor was successful.

5: Calibration of the sensor is suspect. Note: A calibration procedure can be confirmed even if it is suspect.

5.8.2 Calibration procedures of AQUA probe

a ➢ Calibration of the pH sensor

The first procedure is carried out with a standard buffer of pH 7 and 20 °C.

- Screen 1: Gives a summary of the two calibration procedures with a description of the actions to be taken during calibration of the pH sensor.
- Screen 2: The parameter unit being fixed (**pH**), enter the value of the first buffer initialised at **7.01**.

Pour the necessary volume for buffer pH7 (see table 1) in the clean, dry or pre-rinsed calibration cup, and submerge the pH sensor tip in this liquid.

Follow the development of the measure given by the AQUA probe. When this measure is stabilised for at least 30 seconds, confirm the calibration procedure with the « **Validation** » symbol. The report indicates if the first calibration has worked or if it is suspect.

To pass to the second calibration press "**Next**".

The second calibration is carried out with a buffer standard pH 4, pH 9 or pH 10.

- Screen 3: The parameter unit being fixed (**pH**), enter the value of the second initialised buffer: **4.01, 9.00** or **10.01**.

Pour the necessary volume for buffer standard (see Table 1) in a clean, dry or pre-rinsed calibration cup, and submerge the pH sensor tip in this liquid.

Follow the development of the measure given by the AQUA probe. When this measure is stabilised for at least 30 seconds, confirm the calibration procedure with the « **Validation** » symbol. The report indicates if the second calibration has worked or if it is suspect.

To pass to the second calibration press "**Next**".

Rinse the probe with water and dry it. Rinse abundantly and dry the calibration cap for the next calibration.

Screen 4: Gives a summary of the taken actions during the two calibration procedures and indicates if the calibration has functioned well or if one or both calibrations are suspect.

If one of the calibrations didn't function well, this screen indicates also which buffer standard to use again. To repeat a calibration procedure, go back to the corresponding screen pressing "**Previous**".

Confirm calibration of the pH sensor pressing « **End** » A calibration procedure can be validated even if one of the procedures is declared suspect.

Rinse the probe and the calibration cup with water and dry it for future use.

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b ➢ Calibration of the oxygen sensor.

The first procedure is carried out with a mix of water and sulphite to simulate a 0.00 mg/l value.

- Screen 1: Gives a summary of the two calibration procedures and a description of the action to take during calibration of the oxygen sensor.
- Screen 2: The parameter unit is fixed in **mg/l** and the value of the fist measure at **0.00**.

Pour the necessary quantity of the sulphite-water mixture in the clean, dry or pre-rinsed calibration cup (see Table 1) and plunge the AQUA 100 probe tip in this solution. The end of the temperature and oxygen sensors must be submerged.

Follow the measure-development given by the AQUA probe. When this measure is stabilised for at least 30 seconds, confirm the calibration procedure with the « **Validation** » symbol. The report indicates if the first calibration has worked or if it is suspect.

To pass on to the second calibration press "**Next**".

Rinse and dry the probe and calibration cup.

For the second calibration two methods are proposed:

- Calibration by air.
- Calibration with a standard.

- Screen 3: Gives the two calibration options by air and by standard. The first method is based on calibration of the sensor in water-saturated air, the second implies that the concentration of a standard in dissolved oxygen is known.

Choose one of the methods by clicking on the corresponding symbol.

- Screen 4: Calibration by air.

Enter the value of the atmospherical pressure in hectopascal (**hPa**) initialised by normal atmospheric pressure **1013**.

Pour 5 mm of water on the bottom of the calibration cap and place the tip of the probe sensor in the cup. Make sure that the oxygen and temperature sensors are not submerged in the water. Screw the calibration cup lightly (1 or 2 threads) so that the O2 sensor is in contact with the atmospheric pressure. Wait ten minutes for the air in the cap to become saturated with water and for the temperature to stabilise.

Follow the measure development given by the AQUA probe. When this measure is stabilised for at least 30 seconds, confirm the calibration procedure with the « **Validation** » symbol. The report indicates if the second calibration has worked or if it is suspect.

To pass on to the next screen press "**Next**".

- Screen 4 bis: Calibration with calibration standard.

Enter the concentration in dissolved oxygen of the used standard (**mg/l**).

Pour the appropriate standard volume (see Table 1) in the calibration cap and submerge the tip of the AQUA 100 probe sensors in this solution. The tip of the oxygen and temperature sensors must be submerged.

Follow the measure development given by the AQUA probe. When this measure is stabilised for at least 30 seconds, confirm the calibration procedure with the « **Validation** » icon. The report indicates if the second calibration has worked or if it is suspect.

To pass to the final screen press "**Next**".

- Screen 5: Gives a summary of the taken actions during the two calibration procedures and indicates if calibration of the oxygen sensor has worked or if one or both of the steps are suspect.

In case one of the calibrations would not have worked, the screen also indicates which standard to use again. To repeat a calibration step, go back to the corresponding screen pressing "**Previous**».

Confirm the calibration of the O_2 sensor pressing "End». It is possible to confirm this calibration even if one of the procedures was declared suspect.

Rinse and dry the sensors and the calibration cap for future use.

c ➢ Calibration of the temperature sensor.

The first procedure is carried out in an ice-bath of 0.00 °C.

- Screen 1: Gives a summary and description of the actions to be taken during the 2 calibration procedures of the temperature sensor.
- Screen 2: Select the parameter unit initialised in **°C** (or °**F**) and enter the value of the first Standard fixed at **0.00 °C (32.00 °F).**

Pour the necessary volume of a mixture of water with ice (see Table 1) in the clean, dry or pre-rinsed calibration cap and plunge the temperature sensor tip in this liquid. Wait for some minutes for the temperature sensor to reach the temperature of the iced bath.

When the measure given by AQUA probe is stabilised for at least 30 seconds, confirm the calibration procedure with the "**Validation**" symbol. The report will indicate if the first calibration is accepted or suspect.

To pas to the second calibration press "**Next".**

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The second calibration is carried out with a solution of a known temperature.

- Screen 3: Read the temperature of the second Standard with a thermometer of which the functioning has been checked beforehand.

  Select the unit initialised in **°C** and enter the temperature of Standard 2.

  Pour an appropriate volume of Standard 2 (see *Table 1*) in the clean, dry or pre-rinsed calibration cup, and submerge the temperature sensor tip in this liquid.

  Wait some minutes for the sensor to reach the temperature of Standard 2. When the measure given by the AQUA probe is stabilised for at least 30 seconds, confirm the second calibration by pressing the "**Validation**" symbol. The report will indicate if the second calibration has worked or if it is suspect.

  Pass to the next screen pressing "**Next**".

- Screen 4: Displays the taken actions during the two calibration procedures and indicates if they were accepted or if a suspicion was detected during one or both procedures.

  This screen indicates also which Standard needs to be used for the suspect calibrations. To repeat a calibration procedure, go back to the corresponding screen pressing "**Previous**».

  Confirm calibration of the temperature sensor pressing "**End**". It is possible to confirm the calibration even if one of the procedures is declared suspect.

  Rinse and dry the probe and the calibration cup for future use.

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d ➢ Calibration of the ORP sensor.

The first procedure is carried out while exposing the AQUA probe to air. A short-circuit is applied to the ORP sensor to simulate a 0 mV value.

- Screen 1: Summary of the two calibration procedures and description of the actions to take during calibration of the ORP sensor.

- Screen 2: The parameter unit fixed in **mV**, enter the value of the first Standard fixed at **0 mV.**

  Place the AQUA probe in the air and follow its measure developments.

  When the measure is stabilised for at least 30 seconds, confirm the calibration procedure by pressing the "**Validation**" symbol. The report will indicate if the first calibration is validated or suspect.

  To pass to the second calibration press "**Next**".

  The second calibration is carried out with an ORP buffer standard of 240 or 470 mV.

- Screen 3: The parameter unit fixed at **mV**, enter the value of the second Standard initialised at **240** or **470** mV.

  Pour the necessary volume of the selected buffer standard (see Table 1) in the clean, dry or pre-rinsed calibration cap and submerge the ORP sensor tip in this solution.

  Follow the measure development given by the AQUA 100 probe. When this measure is stabilised for at least 30 seconds, confirm the second calibration with the " **Validation** " symbol. The report will indicate if the second calibration was successful or if it is suspect.

  Pass to the next screen by pressing "**Next**".

- Screen 4: Displays the taken actions during the two calibration procedures and indicates if they were accepted or if a suspicion was detected during one or both procedures.

This screen indicates also which Standard needs to be taken for the suspect calibrations. To repeat a calibration procedure, go back to the corresponding screen pressing "**Previous**".

Confirm ORP sensor calibration pressing "**End**". It is possible to confirm the calibration even if one of the procedures is declared suspect.

Rinse and dry the probe and the calibration cup for future use.

e ➢ Calibration of the conductivity sensor.

The first procedure is carried out exposing the AQUA probe to air to simulate a 0 µS value.

- Screen 1: Gives a summary of the two calibration procedures and a description of the actions to be taken during calibration of the ORP sensor.
- Screen 2: The parameter unit fixed in **µS** (mS), enter the value of the first Standard fixed at **0 µS.**

Place the AQUA probe in the air and follow the development of the measure it gives.

When the measure is stabilised for at least 30 seconds, confirm the calibration procedure by pressing the "**Validation**" symbol. The report will indicate if the first calibration is confirmed or suspect.

To pass to the second calibration press "**Next**".

The second calibration is carried out with a conductivity buffer standard of 1413 µS or 12880 µS.

- Screen 3: Select a parameter unit initialised in **µS** (mS) and enter the value of the second Standard at 1413 or 12880 µS**.**

Pour the necessary volume of the selected buffer standard (see Table 1) in the clean, dry or pre-rinsed calibration cap and submerge the conductivity sensor tip in this solution.

Follow the measure development given by the AQUA probe. When this measure is stabilised for at least 30 seconds, confirm the second calibration with the "**Validation**" symbol. The report will indicate if the second calibration was successful or if it is suspect.

Pass to the next screen pressing "**Next**".

- Screen 4: Displays the taken actions during the two calibration procedures and indicates if they were accepted or if a suspicion was detected during one or both procedures.

This screen indicates also which Standard needs to be used for the suspect calibrations. To repeat a calibration procedure, go back to the corresponding screen pressing "**Previous**".

Confirm conductivity sensor calibration pressing "**End**". It is possible to confirm the calibration even if one of the procedures is declared suspect.

Rinse abundantly and dry the probe and calibration cup for future use.

f ➢ Calibration of the pressure sensor (Depth).

Placing the AQUA probe at a zero depth carries out the first procedure.

- Screen 1: Gives a summary of the two calibration procedures as well as a description of the actions to be taken during calibration of the pressure sensor.

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- Screen 2: Select the parameter unit initialised in **cm** (m, in or ft), the value of the first Standard initialised at **0.**

  Place the AQUA probe at zero depth and follow its measure development.

  When the measure is stabilised for at least 30 seconds, confirm the calibration procedure by pressing the "**Validation**" symbol. The report will indicate if the first calibration is validated or suspect.

  To pass to the second calibration press "**Next**".

  The second calibration is carried out with a known depth, other than zero.

- Screen 3: Select a parameter unit initialised in cm (m, in or ft) and enter the depth of Standard 2.

Place the AQUA probe in this depth and follow its measure development. When this measure is stabilised for at least 30 seconds, confirm the second calibration with the "**Validation**" symbol. The report will indicate if the second calibration was successful or if it is suspect.

Pass to the next screen pressing "**Next**".

- Screen 4: Displays the taken actions during the two calibration procedures and indicates if they were accepted or if a suspicion was detected during one or both procedures.

This screen indicates also which Standard needs to be used for the suspect calibrations. To repeat a calibration procedure, go back to the corresponding screen pressing "**Previous**".

Confirm the pressure sensor calibration pressing "**End**". It is possible to confirm the calibration even if one of the procedures is declared suspect.

Rinse and dry the probe and the calibration cup for future use.

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5.8.3 What to do in case of a suspicious calibration?

If there is suspicion of one of the calibration procedures, check on the following points:

- Check that the Standard value entered by the user corresponds to the calibration procedure.
- Check the Standard solution (cleanliness, calibration standard used in accordance with the procedure).
- Check the general condition of the sensor.
- Check the connections between the AQUA probe and the computer (cable ends, cleanliness of the connectors, general condition of the connectors).

If everything has been checked and the problem persists, contact the after sales service department to determine the origin of the disfunctioning (defect sensor, disfunctionning of the AQUA probe etc.).

6. CALIBRATION FREQUENCY

Sensor	Temperature	Depth-Level	Conductivity	pH
Period	2 years Zero and slope	Zero (Del 0) : 2 days Slope: 2 years	6 months Zero and slope	15 days pH7 and pH4

Sensor	ORP (Redox)	D.O. (Oxygen)
Period	15 days Zero and slope	Zero : 2 months Slope : 15 days

7. SENSORS PRINCIPLES AND TEMPERATURE COMPENSATION – METROLOGICAL STANDARDS.

7.1 PARAMETERS:

Preliminary : measures are compensated according to ISO standards and AFNOR. The compensations have a maximum of precision between +5 and +30 °C. Never exceed water temperatures -5 °C, +50°C.

7.1.1 Temperature parameter (sensor integrated in the conductivity probe) :

- Principle : Pt100 Ohms 1/3 DIN, 3 wires assembly.
- Scale – 5 to + 64 °C (if D.O. and pH/Redox sensors disconnected) ;
  If not – 5 to + 45 °C with all sensors connected.
  Resolution 0,01 °C. Accuracy ± 0,1 °C.

Linearization by mathematical model according to answer **Pt100 DIN IEC 751/ Scale ITS-90**
This temperature sensor automatically compensates, in calibration (calibration with standard solutions) and measurement modes, the pH and conductivity parameters and generates the saturation table of dissolved oxygen (this last parameter is compensated in measuring mode by an incorporated thermistor in the head of cell DO2).

7.1.2 Conductivity parameter :

- Sensor with a 4 slit electrodes cell without wall attachment effect: 2 current electrodes and 2 potential electrodes.
- 4 measurement ranges: 0-200 µS/cm, 200-2000 uS/cm, 2-20 mS/cm, 20-200 mS/cm with the same relative accuracy in each range (0,5 %). Resolutions 0,1 µS/cm, 1uS/cm, 0,01mS/cm and 0,1 mS/cm. (1 standard by range). Fixed ranges in calibration mode (calibration on standards), strong recommendation to work in automatic range in measurement mode for optimal accuracy.

  Conductivity signal is compensated in temperature and brought back to the reference temperature of 25 °C. The temperature variation coefficient used for the compensation, around 2 % at 25°C, is indexed on that of KCl N/100 (1413 uS/cm at 25 °C), very close to natural water and sea water.
  (Non linear function according to NF T 909-031 /EN 27888)

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7.1.3 Dissolved Oxygen parameter :

- Clark polarographic probe (Platinum-Ag/AgCl) with a PTFE membrane ; unsaturated KCl electrolyte. Calibration in the air : saturation table is automatically generated according to the temperature measured by Pt100 ; this calibration value is automatically compensated in altitude by a barometric sensor incorporated in the ACTEON 3000 (logger terminal/calibrator). Fast-reacting sensor requires stirring of the aqueous medium under measurement.
- Maximum scale 0-50 mg/l (if super saturation). Nominal : 0-20 mg/l
  Resolution 0,01 mg/l. Accuracy ± 0,2 mg/l from 0 to 20 mg/l.
  Resolution 0,01 mg/l. Accuracy ± 0,2 mg/l from 0 to 20 mg/l.
- Signal compensated in temperature by separate thermistor built-in in the sensor. (Standard **NF T90-106**)

7.1.4 pH parameter :

- Sensor with sensitive glass electrode. Combined reference saturated Ag/AgCl KCl.
- Measuring range : from 0 to 14 pH unit.
  Resolution 0,01 pH unit. Accuracy ± 0,2 pH unit.
- Answer compensated in temperature according to the NERNST law.
- (Standard **NF T90-008**)

7.1.5 Redox Potential parameter (ORP) :

- Electrode with a platinum disc. Combined with reference saturated Ag/AgCl KCl.
  Nominal measurement range : ± 1000mV (in certain cases ± 1500 mV).
  Resolution 1 mV. Accuracy ± 20 mV.
- Intrinsic answer, non compensated in temperature, following ISO recommendations.

7.1.6 Level parameter :

- Absolute piezo-resistive sensor scale 0-10m (or 0-50 m in option).
- Simple water level gauge with ± 1 %. Resolution 1cm.
- Not yet compensated in atmospheric pressure, will be with the next software release.

7.2 TEMPERATURE RECOMMANDATIONS FOR LABORATORY CALIBRATIONS.

(to follow with calibration of very high degree of accuracy or metrological checking of the measures in standard and buffer solution).

Nota : If you want to perform a complete calibration (with hight precision) of your AQUA 100 with the aid of the calibration menu of the ACTEON 3000 you must start with the temperature sensor.

7.2.1 Temperature :

If you want to calibrate your temperature sensor (at 0-50 °C for exemple), you need to disconnect the 2 other sensors (pH/ORP and Oxygen sensors) and replace these 2 sensors by waterproof obturating plugs. **The combinated pH/ORP POD and the Oxygen POD could be damaged by the temperature variation 0 to 50 °C (crack glass, pH shunt or floating measure).**
It is preferable to limit the maximum temperature at 30°C. In this case, you need to start with the 0°C in an ice bath (ice + water). Attention, if the probe is equipped with its 3 sensors, the temperature variation has to take place progressively, in order to avoid the thermal shocks. During the calibration process, it is advised to immerse completely the sensor heads in the calibration solution and to agitate the water to avoid heat gradients. Wait 30 minutes until the temperature is stabilized (+/- 2/100 of the °C).

*In the following procedures, you must always await **stabilization of the temperature** before validating a calibration or raise a measure to a standard.*

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7.2.2 Conductivity :

You could calibrate the conductivity sensor in a KCl standard at all temperatures but it is preferable to proceed between 20 and 25°C.
(**Before and after immersion in a standard, rinse well the sensors and entirely with distilled water and dry them**, especially before calibration or checking the standard of 84 uS/cm, this one being very easily polluted). Always begin with the calibration of the lower range 200 µS/cm and so on until 200 mS/cm.
The zeros for conductivity are done in the air, slit of measurement of the sensor preliminary rinsed then dried. **During the calibration using standard of 84µS/cm, it is strongly advised to first disconnect PODs sensors pH/Redox and Dissolved Oxygen, and insert the two obturating plugs tight in their place on the 2 released base plates.** Indeed these two sensors are likely to throw out a significant quantity of KCl salt in the standard of very low conductivity, especially the Ag/AgCl reference by the means of its Plastogel^{R} polymer gorged with saturated KCL (communication through the 1/10 mm side hole in the blue body cylindrical of pH/ORP POD). The pollution of the standard 84 µS/cm is rather fast, especially if you await the perfect thermal stabilization of the sensor, which takes several minutes. **It is even advised to proceed the same way for the standard 1413 µS/cm if one wishes a calibration of laboratory precision on this measurement range, with better than +/- 0,5 %.**.

7.2.3 Dissolved Oxygen (D.O.) :

You can calibrate in the air at any temperature. However it is preferable to proceed at the temperature of water measurement. Immerse the AQUA sensor in the measurement water so that Pt100 sheathed stainless at the end of the conductivity POD is put at temperature, as well as the D.O. probe itself, then lift the probe out of the water, drain the probe, but without drying the D.O. cell , then gauge swiftly without awaiting the temperature increase or decrease in the air. The TEFLON membrane is still hydrated, which improves the precision of the operation.
Another procedure consists in placing some water drops in the protection case of the sensors heads of the AQUA which is also used as calibration cup, and screw it without exceeding the O ring (not to put in pressure the oxygen sensor), then immerse the end of the probe in the measurement water (without exceeding the top of the preserving case), await a few minutes the temperature stabilization, then validate the value of measured saturation, (calculated with the water temperature and the barometric air pressure).

Nota1: The preliminary calibration of zero O2 in water added with sodium sulphite is completely independent of the temperature of this water.
Nota 2: With normal atmospheric pressure and null salinity, the PONSEL saturation table according to the temperature (thus calibration) of the dissolved oxygen is shifted approximately 0,5 mg/l on average compared to the saturation table of a not salted pure water. This to hold account of the difference state of the hydration of PTFE membrane, between the air saturated with water and water saturated with oxygen in balance with this air. According to this PTFE hydration state (naturally hydrophobic) the diffusion of oxygen through this membrane is very slightly higher in the air, whereas the pO2 (partial pressures) are equal in the gas phase and the dissolved phase, and that consequently the response of the manometric probe of Clark should not present a difference (in theory...).

The table presented below holds account for this correction. Actéon and ActeWin have this table in memory, and during the calibration, carry out the interpolation of temperature, then Actéon automatically applies the barometric correction (built-in barometer), whereas it is introduced manually in hPa for ActeWin on PC. In all the cases calculations providing the calibration value are automatic and the user does not need to know the table and the function of correction, but they are given here for information purposes.

$$O_2Cal(t°C, P_{atm}) = O_2Cal(t°C, 1atm)\frac{P_{atm}}{1013} \qquad \text{Patm en hPa}$$

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PONSEL saturation table : Calibration table to the humid air (mg/l), corresponding to the saturation table of dissolved oxygen in fresh water : For Salinity = 0. Depth = 0. Altitude = 0 (1atm). Relative humidity = 100 %

t °C	**O_2Cal (t_n ,1atm)** mg/l	t °C	**O_2Cal(t ,1atm)** mg/l
< 0	15.14	30	8.06
0	15.14	31	7,93
1	14.72	32	7.80
2	14.32	33	7.68
3	13.94	34	7.57
4	13.59	35	7.46
5	13.24	36	7.34
6	12.92	37	7.23
7	12.61	38	7.13
8	12.31	39	7.03
9	12.03	40	6.93
10	11.76	41	6,83
11	11.51	42	6,73
12	11.27	43	6,63
13	11.03	44	6,54
14	10.80	45	6,45
15	10.58	46	6,35
16	10.36	47	6,26
17	10.16	48	6,17
18	9.96	49	6,08
19	9.77	50	5,99
20	9.58	51	5,91
21	9.40	52	5,83
22	9.23	53	5,75
23	9.05	54	5,67
24	8.91	55	5,59
25	8.75	56	5,51
26	8.61	57	5,43
27	8.46	58	5,35
28	8.32	59	5,28
29	8.19	60	5,21

NOTA : Altitude = 0 → normal Atmospheric pressure = 1013 hPa (760 mm Hg)

e.g. of t°C interpolation and correction of barometric pressure : 998 hPa the real atmospheric pressure O2Cal(20,76 °C, 1atm)) = [O2Cal(21°C). (20,76 - 20) + O2Cal(20°C). (21 - 20,76)]/(21 - 20) = 9,443 mg/l

O_2 Cal(20,76 °C, 998 hPa) *= O_2Cal(20,76 °C) · 998* ***/ 1013*** *=* ***9,303 mg/l*** *(rounded with 9,30) (temperature 20,76°C)*

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7.2.4 pH :

You can calibrate this parameter at all temperature but it is preferable to proceed between 20 and 25°C.
Warning : the temperature compensation of pH exploits only the intrinsic response of the probe in an unspecified aqueous medium, which is delivering a potential known as of NERNST potential, where the absolute temperature appears (on the NERNST slope : ln10.RT/nF ; at 20 °C, this slope is equal to 58,1641 mV/°C), and introduces a compensation to deliver the real pH.
This compensation does not integrate the effect of the temperature variations on the various pH buffers (different between them). As a result, you should calibrate with pH buffers stabilized at 25 °C and validate 7.01 and 4.01 pH values (buffer values at 25°C), or calibrate at another temperature and manually define the corresponding values of the buffers before validating; ex 7.03 and 4.00 at 20°C. These buffer values changes according to temperature are precised here under :

1) pH 7.01:

°C	°F	pH
15	59	7.04
20	68	7.03
25	**77**	**7.01**
30	86	7.00
35	95	6.99

2) pH 4.01:

°C	°F	pH
15	59	4.00
20	68	4.00
25	**77**	**4.01**
30	86	4.02
35	95	4.03

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7.2.5 Redox Potential (ORP) :

It is imperative and compulsory to calibrate the ORP at 25 °C ; values such as 240 mV and 470 mV being given at this temperature. The intrinsic response of the redox probe is not corrected in temperature because according to the oxydo-reducers couples in presence in water, each NERNST slope of reversible reactions is proportional to the numbers of exchanged electrons and thus to the variations of oxydation steps (1,2, 3, etc). Thus it is not possible to carry out a multi-correction of temperature. Accordingly, one takes this measurement in its intrinsic meaning, the oxydoreduction potential being by definition what the noble metal plunged in water compared to the electrode of Ag/AgCl reference delivers.

7.2.6 Water Level :

At the moment, this parameter is not sufficiently compensated to provide a metrological value, i.e. +/- 1 cm of water, but is used in fact as an indicator of immersion for the AQUA 100 probe from 0 to 10 m (or from 0 to 50 m in option).
A compensation of this parameter for daily variations of atmospheric pressure through the incorporated barometer of the Actéon 3000 is to be implemented in the sofware by end of 2005. Without this compensation, the zero can vary by several cm between day and night.
There is a temperature compensation on the side sensor of hydrostatic pressure, but it is advised to calibrate at the temperature of the water to be measured, especially for the zero in the air (atmospheric pressure). Thus, immerse entirely the AQUA 100 in the water to be measured, wait approximately one minute, then lift it and action immediately Del **0** in « **Measures »** mode.
The slope is less sensitive to temperature variations ; if you still want to calibrate it, use preferably a water column or a pressure standard equivalent to the full scale (10 m or 50 m).

8. DESIGN FEATURES

8.1 ACTEON 3000 TERMINAL

Data storage	: 32 768 measures batches of 6 time-stamped parameters (Standard version 1MB) : 262 144 measures batches (Version 8MB)
Power	: 4 standard alkaline batteries 1,5 V AA LR6
Capacity	: 2 000 hours
Communication protocol	: SDI 12
Dimensions (w x l x d)	: 145mm x 245mm x 110mm
Weight	: 600 g
Operating temperature	: -5°C to +50°C
Degree of protection	: IP 67

8.2 AQUA PROBE

8.2.1 SENSOR FEATURES

SENSORS		
Temperature	Sensor type	Platinum probe PT 100Ω
	Range	-5°C to + 50°C
	Resolution	0,01°C
	Accuracy	± 0,1°C
Conductivity	Sensor type	4 slotted electrodes
	Range	0 to 200 mS/cm in 4 ranges
	Resolution	0,001mS /cm to 0,1mS/cm
	Accuracy	± 0,5% of the reading
pH	Sensor type	Combined glass electrode
	Range	0 to 14 units
	Resolution	0,01
	Accuracy	± 0,05
ORP	Sensor type	Platinum probe
	Range	-999mV to +999mV
	Resolution	0,1mV
	Accuracy	± 20mV
Dissolved Oxygen	Sensor type	Polarographic monolithic
	Range	0 to 20mg/l
	Resolution	0,01mg/l
	Accuracy	± 0,2mg/l
Pressure (depth)	Sensor type	Piezoresistive sensor
	Range	0 to 10m
	Resolution	1cm
	Accuracy	± 1% Full Scale

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8.2.2 MECHANICAL FEATURES

Dimensions	: L=420mm ∅40mm
Weight	: 500 g
Operating temperature	: -5°C to +40°C
Degree of protection	: IP68 5 bars
Communication protocol	: SDI 12

8.3 ACTEWIN SOFTWARE

Minimum hardware requirements	:PC III 400 MHz 64MO RAM
Environment	:Windows 98, NT 2000, XP
Required memory	: 2MB
Format	: CD ROM 800MB with user manual in .pdf file
Accessories	: Actewin RS232/SDI 12 adapter with connection cables for AQUA probe and Acteon 3000 terminal

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9. PONSEL AQUA PROBE connexion to ISCO 6712/6712FR and AVALANCHE

1-Please connect the PONSEL AQUA probe with the special cable interface ref PONAQUCAB2 on the SDI12/rain gauge connector of the 6712/AVALANCHE sampler.

2-You must be in Extended Programming to use the probe with the 6712 or Avalanche sampler (code 6712.2). The sampler can automatically scan for the presence of sensors, if no, you have to select "others functions" then "Hardware" and select "SDI12 sondes". The screen will tell you "one sonde identified "

3-then you have to confirm the address of the sensor, the software tells you "0", you have to confirm going on 0 and press.
Please don't go on "done" if the setup of the probe is not made.

4- Then the screen will tell you the number of 6 data sets **. It's now very important to enter separately the different parameters and units respecting strictly their order (1 to 6)**

PARAMETER	UNITS
1 =LEVEL	meters
2 = CONDUCTIVITY	microSiemens (µS/cm)
3 = pH	0 à 14
4 = ORP (Redox)	milliVolts
5 = TEMPERATURE	°C
6 = DISSOLVED OXYGENE	mg/l

5- Please tell if you want to store all the parameters or only selected parameters

6- Then the screen is going back on the probe address, if setup is correct please go on "done" and press

7-The screen will tell, you "new hardware, previous stored data will be erased"
please answer by YES for validation of the parameters…

8- You may run a calibration only for the probes mentionned (pH, dissolved oxygen, ORP) please follow the instructions and press done afterwards.

9- You may also check the right value measured for a standard well known but you will not be able to modify this value.

10-The setup is now finished and you may leave the hardware function

11- If you want to see the value of the different parameters on the screen, please go to "view report", then" data" then "SDI12" , the readings of the different parameters appear on the screen,
An asterisk before the data value tells that the measurement is invalid and not working.

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Connection probe AQUA on interface cable PONSEL :

Branchement du câble interface PONSEL sur AVALANCHE ISCO (entrée Rain Gauge) :

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10. SECURITY-SAFETY SHEETS

10.1 pH STANDARDS

- *pH 4 - Composition* :
  Potassium hydrogen phthalate < 2 %
  Stabilisers < 0.01 %
  Water.
- *pH 7 - Composition* :
  Phosphate compounds < 1 %
  Stabilisers < 0.01 %
  Water
- *pH 10 - Composition* :
  Carbonated compounds < 1 %
  Water

• *Physical and chemical properties:*
Appearance: slightly soapy
Smell: Odourless
Physical condition: liquid.
Solubility: can be mixed with water.
Melting point: not applicable.
Boiling point: > 100 °C.

• *Toxicological information:*
Swallowing large amounts will cause nausea, vomiting and diarrhoea.
Contact with the skin can cause irritation and dermatitis in case of long-lasting exposure.
Contact with the eyes can cause irritation and conjunctivitis.
No mutagen or teratogen effects known.

• *First aid:*
Ingestion: Rinse the mouth carefully with water.
Drink a large amount of water.
In serious cases, see a specialist.
Skin contact: Wash abundantly with water and soap.
Eye contact: Wash abundantly with water. If the irritation persists, see a specialist

• *Protection:*
Carrying of protective glasses and rubber gloves is advised.

• *Handling and storage:*
Handling: Don't eat or drink while handling the product.
Wash hands and face after using the product.
Storage: Store at room temperature (15 - 25 °C).
Protect from direct sunlight.
Keep out of reach from children.
Keep the container closed.

• *Waste removal:*
Chemical waste is often classified as 'special waste' and collection is often organised locally. Please contact the local authorities for details.

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10.2 Buffer standard ORP 470 mV :

- *Composition* :
  Sulphuric acid < 5 %
  Water.

  • *Physical and chemical properties:*
  Appearance: clear yellow liquid.

  Smell: Odourless.

  Solubility: can be mixed with water.

  Melting point: not determined.

  Boiling point: not determined.

  • *Toxicological information:*

  Swallowing will cause irritation of the mucous membranes in the mouth, of the pharynx and of the œsophagus and can spread to gastro-intestinal irritations.

  Contact with the skin can cause irritation.
  Contact with the eyes can cause severe irritation.
  Inhalation can cause irritation of the mucous membranes together with coughing.

  • *First aid:*

  Ingestion: Rinse the mouth carefully with water. Drink a large amount of water.

  In serious cases, see a specialist.

  Contact with the skin: Wash abundantly with water.

  Contact with the eyes: Wash abundantly with water. If irritation persists, see a specialist.

  • *Protection:*

  Carrying of protective glasses, rubber gloves and a mask (to avoid inhalation) is advised.

  • *Handling and storage:*

  Handling: Don't eat or drink while handling the product.

  Wash hands and face after using the product.

  Storage: Store at room temperature (15 - 25 °C). Protect from sunlight.

  Keep out of reach from children. Keep the container closed.

  • *Waste removal:*

  Chemical waste is often classified as 'special waste' and collection is often organised locally. Please contact the local authorities for details.

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10.3 Buffer solution ORP 240 mV:

• *Physical and chemical properties:*

Appearance: yellow liquid.
Smell: Odourless.

Solubility: can be mixed with water.

Melting point: not determined.

Boiling point: not determined.

• *Toxicological information:*

Swallowing cause stomach problems.
Contact with water causes irritation.

• *First aid:*

Ingestion: Rinse the mouth carefully with water.

Contact with the skin: Wash abundantly with water.

Contact with the eyes: Wash abundantly with water. If irritation persists, see a specialist.

• *Protection:*

Carrying of protective glasses and rubber gloves is advised.

• *Handling and storage:*

Handling: Don't eat or drink while handling the product.

Wash hands and face after using the product.

Storage: Store at room temperature (15 - 25 °C).

Protect from sunlight.

Keep out of reach from children.

Keep the container closed.

• *Waste removal:*

Chemical waste is often classified as 'special waste' and collection is often organised locally. Please contact the local authorities for details.

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10.4 Conductivity standard solutions:

- *Composition* :

Potassium chloride < 5 %

Water.

• *Physical and chemical properties:*

Appearance: uncoloured liquid.

Smell: Odourless.

Solubility: can be mixed with water.

Melting point: not determined.

Boiling point: > 100 °C.

• *Toxicological information:*

Swallowing a large quantity causes nausea, vomiting or diarrhoea and can also lead to cardiovascular problems.

No mutagen or teratogen effects known.

• *First aid:*

Ingestion: Rinse the mouth carefully with water.

Contact with the skin: Wash abundantly with water and soap.

Contact with the eyes: Wash abundantly with water. If irritation persists, see a specialist.

• *Protection:*

Carrying of protective glasses and rubber gloves advised.

• *Handling and storage:*

Handling: Don't eat or drink while handling the product.

Wash hands and face after using the product.

Storage: Store at room temperature (15 - 25 °C).

Protect from sunlight.

Keep out of reach from children.

Keep the container closed.

• *Waste removal:*

Chemical waste is often classified as 'special waste' and collection is often organised locally. Please contact the local authorities for details.

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11. PARTS REFERENCES

PART-REFERENCE	DESCRIPTION
PONACTEON	ACTEON 3000 ; delivered in a bag
PONAQUA	AQUA 100 multiparameter probe with 10m cable
PONACTEWIN	ACTEWIN software with SDI12/RS232 adapter and cables
PONAQU-CAUSB	USB → RS232 Adapter
PONAQU-CAB2	AQUA 100 ⇔ ISCO interface cable
PONVM3	Travelling bag
PONVM4	Hard cover case
PONAQU-O2	Dissolved Oxygen sensor
PONAQU-C4/T	Conductivity/Temperature sensor
PONAQU-PH/RH	pH/ORP sensor
PONCABL -xx	AQUA 100 probe cable – xx m
PONAQU-LEST1	Stainless steel ballast (200g) for AQUA
PONAQU-LEST2	Stainless steel ballast (500g) for AQUA
PONAQU-CREP	PVC cap for AQUA with LEST1
PONAQU-ETUI	Protective watertight cylindrical case (for transport and also calibrations)
PONAQU-CAP1	Cap of waterproofness for AQUA sensor plug
PONAQU-CAP2	Connector-plug 12 contacts AQUA
PONACTW-ADPT	Actewin SDI12/RS232 adapter
PONACTW-CAQU	AQUA ⇔ Adapter SDI12/RS232 cable (1,50m)
PONACTW-CACT	Acteon ⇔ Adapter SDI12/RS232 cable (1,50m)
PONACTW-LOG	CD containing ActeWin software + user manual in pdf format
PONACT-CIMP	Cable for impulsional output (5,00m) (water sampler)
	Consumables
PON-PH-AMP-4	Calibration standard pH 4,01 à 25°C (125ml)
PON-PH-AMP-7	Calibration standard pH 7,01 à 25°C (125ml)
PON-PH-AMP-10	Calibration standard pH 10,01 à 25°C (125ml)
PON-EH-SOL-470	Calibration standard ORP 470mV à 25°C (125ml)
PON-EH-SOL-240	Calibration standard ORP 240mV à 25°C (125ml)
PON-C-SOL 84	Conductivity calibration standard 84µS à 25°C (125ml)
PON-C-SOL 1413	Conductivity calibration standard 1413µS à 25°C (125ml)
PON-C-SOL 12880	Conductivity calibration standard 12880 µS à 25°C (125ml)
PON-C-SOL 112800	Conductivity calibration standard 112800 µS à 25°C (125ml)
PON-02-EL	Oxymetric electrolyte solution for D.O. sensor
PON-O2-ZR	
PON-SOL-NET	Cleaning solution for electrodes pH (pepsine) (125ml)
PON-SOL-CSV	Preservation solution for electrodes (125ml)
PON-O2-MBA6	Set of 6 spare membranes for the Dissolved Oxygen sensor
PON-4LR6	Set of 4 Alkaline batteries AA LR6
PON-4NICD-AA	Set of 4 accumulators Ni-Cd AA

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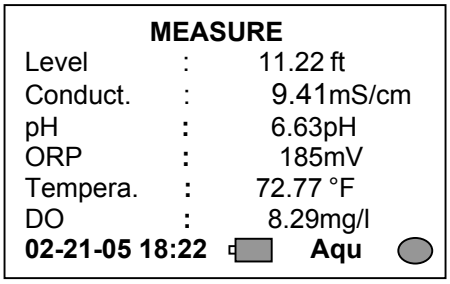
12. FAQ

Question :

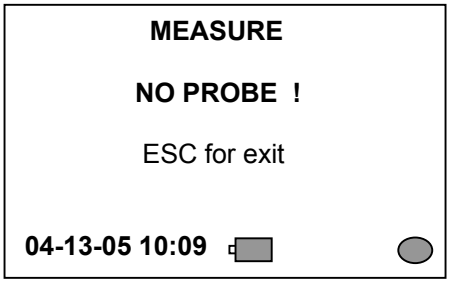
AQUA 100 probe connected,

My ACTEON 3000 terminal displays « NO PROBE ! ». What should I do?

With the Actéon 3000 terminal running, and the AQUA 100 connected, the icon **Aqu** must be displayed in the bottom right corner of the Actéon 3000 screen. Activating the **Measure** mode (perpetual measuring) of the **MAIN MENU**, the 6 measured values of the 6 parameters are displayed every 5 seconds (after the message :**MEASURE IN PROCESS** has been displayed for a few seconds):



If the icon **Aqu** does not appear, and if after activating the **Measure** mode the screen does not display the measured values of the 6 parameters , and instead appears the message : **NO PROBE** ! , it means the AQUA probe has not been detected by the terminal and that the SDI-12 communication between the probe and the terminal could not be established :



In that case, proceed with the following controls:

1-1 <u>Are the cable connectors correctly fixed on their respective sockets?</u>

In other words, are the connectors well in place and properly locked on their respective AQUA and Acteon sockets. Pulling on the ends of the cable has a locking effect. Also check there is no water inside the connectors, otherwise, rinse with demineralised water, specially after use in salted water, then dry for instance with an hair dryer.
At last check that no pin from either male connector has been torn, broken or bent over in its housing.

1-2 <u>Are the batteries worn out ?</u>

(Battery icon completely white for more than one week). Replace them with new ones (use a simple screw driver to open the back of the handle of the Acteon terminal).
Note : the recording files are saved on Flash memories (for 20 years without any power supply) in the Acteon terminal and there are no risks of loosing them during battery change.
Only date and time are lost, as well as recording parameters, easy to reconfigure manually or which are easy to save on your PC hard disk through Actewin.

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1-3 Is the Acteon still in recording mode ? (most frequent case)

If **Rec** icon is still displayed on the screen (with or without other associated icons like **Aut**, **A↓,** ⎍), the Actéon terminal is still in automatic recording mode, whether the AQUA probe is connected or not, and whatever the starting mode which has been initially chosen (manual or programmed) .
In this case, go to **MAIN-MENU → Configuration → Recording→ Stop recording .** Check that the **Aqu** icon reappears with the probe connected, and that the 6 measured values are refreshed every 5 seconds.

1-4 The previous checks have not been successful, and the icon Aqu doesn't appear on the screen, the AQUA probe cannot be detected from the Acteon:

- Try to connect the AQUA to a PC using ACTEWIN and the SDI12/RS232 connexion to the RS232 port (preferably COM1) using the appropriate cable which has been supplied :
- If the probe is detected activating the AQUA 100 menu, **it's very likely that the first Acteon/AQUA cable is defective, and the AQUA probe is not to blame.** The Acteon terminal is usually not to blame : it can also be tested connecting it to the PC and activating the **Import** or **Recording Programming** menu in Actewin. If (very unusual), the ACTEON does not talk with the PC under Actewin, you should ***reset*** the ACTEON opening the batteries housing (even with new batteries) and disconnecting one battery for a few seconds ; put it back in place, no recorded files have been erased (see 1-2).

- If the probe has not been detected, and the following message is displayed for the AQUA : **Can't find SDI-12 line. Check wires** , and the ACTEON terminal has been detected, no formal conclusion can be drawn : **either the AQUA-ACTEON liaison cable or the AQUA are defective**. In a last attempt, you can ***reset*** the AQUA disconnecting it completely from the PC or the Acteon terminal. Without power supply, you have to wait for a few hours until the total reset of the terminal is completed. During these few hours, leave the probe at normal temperature (18 to 25 °C), it might by accident have gone through extreme temperatures or thermic shocks.

If after that last AQUA ***reset*** the problem remains, it is advised, before calling your PONSEL after sales service, to check the perfect state of the three detachable probes pods: sometimes, sensors in short circuit (broken pH glass bulb, burst O_2 membrane, ..), sensor connectors which have been in contact with salted water or not properly clipped can result into brutal electrical over consumption and thus lead to the termination of the SDI-12 communication (thus avoiding to communicate wrong measured values and helping to identify a defective sensor).

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